

2015

# HIV Testing Among Young African American Men Who Have Sex With Men

Tayo B. Awopeju  
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# Walden University

College of Health Sciences

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Tayo Ben Awopeju

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Walden University  
2015

Abstract

HIV Testing Among Young African American Men Who Have Sex With Men

by

Tayo B. Awopeju

Dissertation Submitted in Partial Fulfillment

of the Requirements for the Degree of

Doctor of Philosophy

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## Abstract

Young African American men who have sex with men (AAMSM) are at greater risk of being infected with the human immunodeficiency virus (HIV) and less likely to seek HIV testing than are members of other demographic groups. This behavior results in a significant public health threat because young AAMSM with an unrecognized HIV infection are less likely to practice safer sex and, therefore, more likely to pass the infection on to their partners. This study is an examination of the social and personality factors that influence HIV testing rates among young AAMSM, using Aday's model of the social determinants of health and the Big Five model of personality as the theoretical frameworks. A cross-sectional design was employed, and social networks were used to recruit study respondents. Forty-three young AAMSM completed online questionnaires, and multiple regression techniques were used to examine relationships among the variables of interest. Statistical analysis indicated that neither the social risk factors derived from Aday's model nor the Big Five model predicted HIV testing. However, it is unknown whether these nonsignificant findings are attributable to a genuine lack of influence or the unique characteristics of the sample. Given the null results of this study and the mixed findings of prior research, further studies are required to draw conclusions regarding the influence of social and personality factors on HIV testing in this high-risk group. Additional research could be helpful in developing more effective strategies for encouraging HIV testing among young AAMSM. The potential for positive social change lies in slowing the spread of HIV through this vulnerable population and in engaging young AAMSM in the medical system to improve their long-term health prospects.

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## Dedication

This dissertation is dedicated to my late grandmother, Folashade Oduekun, who supported my dreams during this journey that we call life. She gave me the drive, encouragement, and constant love that have sustained me. There is no doubt in my mind that without the discipline she instilled in me, I could not have completed this process.

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## Chapter 1: Introduction to the Study

### **Introduction**

In this study, I investigated the social and personality factors that influence human immunodeficiency virus (HIV) testing rates among young African American men who have sex with men (AAMSM). It is an area worthy of research for several reasons. First, young AAMSM are far more likely to acquire HIV infection than young men of any other U.S. racial group (Fields et al., 2012). Second, HIV infection is spreading rapidly among this population (Prejean et al., 2011). Third, AAMSM are less likely to seek HIV testing than men of other demographic groups (Magnus et al., 2010).

Prevention is critical to reducing rates of HIV infection, and testing is a key aspect of prevention because those who know that they are HIV positive can take steps to reduce their risk of infecting others. However, strategies to increase HIV testing must be based upon an understanding of the factors that contribute to HIV test avoidance. Without this understanding, prevention approaches are less likely to be successful. The findings from this research have contributed important insights regarding factors that make young AAMSM less likely to seek testing, which will be useful for developing more effective strategies to encourage testing among this high-risk group.

The chapter that follows provides an overview of this research. It begins with background information, a statement of the problem to be addressed, the purpose of the study, and research questions and hypotheses. This introductory overview is followed by a summary of the theoretical foundations and conceptual framework developed for this research, as well as the general nature of this study. The third section provides definitions

of variables and key terms, the fourth lists the assumptions upon which this study was premised, the fifth defines its scope and delimitations, the sixth describes its limitations, and the seventh covers its significance. The final section provides a brief summary of this chapter.

### **Background**

My research focused on young African American men who have sex with men (AAMSM). MSM as a population are characterized behaviorally (engaging in sexual contact with other men, not excluding sexual contact with women), rather than by gender identification or sexual orientation. Young AAMSM are more likely to engage in risky sexual behaviors than their older counterparts (Murphy, Brecht, Herbeck, & Huang, 2009), and they are 5 times more likely than men of other racial groups to become infected with HIV (Fields et al., 2012). Young AAMSM have the highest rate of HIV infection in the United States (Fields et al., 2012), and HIV infection is spreading more rapidly among African Americans than any other U.S. racial group (Friedman, Cooper, & Osborne, 2009), particularly among AAMSM (Prejean et al., 2011). It is, therefore, critical for members of this demographic population to seek regular HIV testing.

Past research has linked social factors with HIV risk behaviors (Ayala, Bingham, Kim, Wheeler, & Millet, 2012; Eaton, Kalichman, & Cherry, 2010; Elkington, Bauermeister, & Zimmerman, 2010; Halkitis & Figueroa, 2013; Murphy et al., 2009; Mustanski, Newcomb, Du Bois, Garcia, & Grov, 2011), as well as the likelihood of seeking HIV testing (Johns, Bauermeister, & Zimmerman, 2010; Washington, Robles, &

Malotte, 2013). Thus, there is evidence that socioeconomic status plays a role in HIV risk, diagnosis, and prevention.

The influence of personality on HIV testing rates is a largely unexplored area. Only one recent study examined the correlation between a particular Big Five personality dimension, conscientiousness, and HIV testing rates, identifying no significant effect (Hagger-Johnson & Shickle, 2010). The Big Five personality trait framework is a standard framework of personality characteristics including conscientiousness, openness to experience, extraversion, agreeableness, and neuroticism (Hagger-Johnson & Shickle, 2010). An older study conducted by Johnson (2000) did find that the Big Five personality dimension of neuroticism predicted a desire for HIV testing, but recent research is lacking. To date, no personality factor research has been done with a focus on HIV testing rates among young AAMSM, though prior studies have linked Big Five personality dimensions to health-protective behaviors in general (Takahashi, Edmonds, Jackson, & Roberts, 2012) and the likelihood of engaging in sexually risky behaviors (Schmitt & Shackelford, 2008; Zietsch, Verweij, Bailey, Wright, & Martin, 2010). There is also evidence for interactive effects among particular social factors and Big Five personality dimensions (Donnellan & Lucas, 2008; Jonassaint, Siegler, Barefoot, Edwards, & Williams, 2011; Lehmann, Denissen, Allemand, & Penke, 2012; Schmitt, Realo, Voracek, & Allik, 2008; Soto, John, Gosling, & Potter, 2011; Vecchione, Alessandri, Barbaranelli, & Caprara, 2012). However, despite these established linkages, prior research has largely ignored the intersection of personality, socioeconomic status, and HIV testing.

Although a number of past researchers have examined HIV testing rates among various populations, few have analyzed their results based on demographic factors such as age, race, or sexual orientation. Moreover, when they have examined any of these factors, they have tended to focus on one or two variables rather than conducting a more comprehensive socioeconomic analysis of contributing factors. In addition, many past studies have focused on substance abusers or those with mental health problems, who are not representative of typical young AAMSM. Moreover, no studies have been conducted to investigate the influence of personality on HIV testing rates among young AAMSM. My study was the first to examine the interactive effects of personality and social factors on HIV testing for this high-risk group, which is an important undertaking, given the public health implications of unrecognized HIV infection and the need to develop better strategies for encouraging testing among high-risk individuals.

### **Problem Statement**

Despite their high rate of HIV infection, studies have shown that AAMSM are the demographic group most likely to have unrecognized HIV infection (German et al., 2011) and least likely to seek HIV testing (Magnus et al., 2010). Lack of testing contributes to higher rates of HIV infection among this population because those who have unrecognized HIV infection are more likely to infect others (Lansky et al., 2010; Magnus et al., 2010). Therefore, lack of HIV testing among young AAMSM is a significant public health concern.

There are many social factors that may contribute to increased risk for HIV infection and lower testing rates among young AAMSM. African Americans are more

likely to be unemployed (Murphy et al., 2009); to live in poverty (Peterson & Jones, 2009), particularly younger AAMSM (Peterson & Jones, 2009); and to suffer from a general deficit in human capital (Murphy et al., 2009; Peterson & Jones, 2009), all of which put them at greater risk for negative health outcomes than other demographic groups (Aday, 2001). Moreover, many African Americans have negative perceptions of the medical establishment as a result of systemic discrimination in the past (Friedman et al., 2009), and they are less likely to access or even trust medical services (German et al., 2011). They also tend to avoid HIV testing due to the fear that they will discover that they are HIV positive (MacKellar et al., 2011). In addition, younger AAMSM are more likely than MSM of other racial/ethnic backgrounds to engage in risky sexual practices as a result of age-related differences in status between themselves and their partners (Fields et al., 2012). Moreover, males are less likely to seek HIV testing than females (Johns et al., 2010).

The influence of personality on HIV testing is a largely unexplored area, though there is plenty of evidence for personality's influence on health-related behaviors. In particular, the Big Five personality dimension of conscientiousness is positively correlated with health-protective behaviors (Takahashi et al., 2012), while extraversion (Schmitt & Shackelford, 2008; Zietsch et al., 2010) and neuroticism (Zietsch et al., 2010) are correlated with an increased likelihood of engaging in risky sexual behaviors. However, a review of the literature indicates that few studies have addressed factors that contribute to HIV test avoidance among young AAMSM, and that none have examined the effects of both personality and social factors on test avoidance in this high-risk group,

nor have they developed a unifying theoretical framework with which to identify the causes of sociodemographic discrepancies in HIV testing. Therefore, this study addressed a gap in the literature by investigating the intersection of personality traits, social factors, and HIV testing rates among young AAMSM, and the findings could potentially be used to inform the development of more effective strategies for encouraging young AAMSM to seek HIV testing, whether through a healthcare professional or by performing an in-home test.

### **Purpose of Study**

The goal of this research was to determine the influence that a number of social and personality factors have on the HIV test-seeking behavior of young AAMSM. The independent variables included social risk factors (age, education, employment, housing, income, marital status) and personality traits (as measured by the Big Five personality dimensions). The dependent variable was HIV testing (including traditional testing and in-home testing). I used correlation and predictive testing (regression), achieved using a cross-sectional design and quantitative methodology, which are described in Chapter 3.

### **Research Questions and Hypotheses**

Given that I investigated the intersecting effects of social factors and personality on HIV testing among AAMSM, the research was guided by three overarching questions:

Q1: Is there a statistically significant association between the participants' personality traits as measured by the Big Five and having an HIV test within the last 12 months, either at a clinic or at home?

- Q2: Is there a statistically significant association between the participants' social risk factors as measured by age, education, employment, housing, income, and marital status and having an HIV test within the last 12 months, either in a clinic or at home?
- Q3: Does the relationship between participants' personality traits as measured by the Big Five and social risk factors as measured by age, education, employment, housing, income, and marital status influence having an HIV test within the last 12 months, either in a clinic or at home?

Corresponding hypotheses for these research questions follow. The first set of hypotheses focused on the influence that the Big Five personality dimensions may have on HIV testing rates among young AAMSM.

H<sub>0</sub>: There will not be a statistically significant association between the participants' personality traits as measured by the Big Five and having an HIV test within the last 12 months, either in a clinic or at home.

H<sub>A</sub>: There will be a statistically significant association between the participants' personality traits as measured by the Big Five and having an HIV test within the last 12 months, either in a clinic or at home.

The second set of hypotheses focused on the social factors that may influence HIV testing rates among young AAMSM. These factors were selected based upon Aday's (2001) model of the social determinants of health, and the findings of prior studies that have linked age (Murphy et al., 2009); education (Cutler & Lleras-Muney, 2010; Johns et al., 2010; Washington et al., 2013); income, employment, and housing (Ayala et al., 2012;

Elkington et al., 2010; Halkitis & Figueroa, 2013; Mustanski et al., 2011); and marital status (Aday, 2001; Bogg & Roberts, 2004) with health-related behaviors and outcomes.

H<sub>0</sub>: There will not be a statistically significant association between the participants' social risk factors as measured by age, education, employment, housing, income, and marital status and having an HIV test within the last 12 months, either in a clinic or at home.

H<sub>A</sub>: There will be a statistically significant association between the participants' social risk factors as measured by age, education, employment, housing, income, and marital status and having an HIV test within the last 12 months, either in a clinic or at home.

The third set of hypotheses focused on the degree to which additional social risk factors influence the contribution of personality traits as they relate to the likelihood of testing.

H<sub>0</sub>: The relationship between participants' personality traits as measured by the Big Five and social risk factors as measured by age, education, employment, housing, income, and marital status will not influence having an HIV test within the last 12 months, either in a clinic or at home.

H<sub>A</sub>: The relationship between participants' personality traits as measured by the Big Five and social risk factors as measured by age, education, employment, housing, income, and marital status will influence having an HIV test within the last 12 months, either in a clinic or at home.

## **Theoretical Foundations and Conceptual Framework**

I developed my study upon the unifying conceptual framework of two theoretical foundations: the Big Five model of personality and Aday's (2001) framework for the social determinants of health. These theoretical foundations and the conceptual model for this research are described in the sections that follow.

### **Theoretical Foundations**

The Big Five model, a well-respected framework for personality studies, comprises five personality dimensions: agreeableness, conscientiousness, extroversion, neuroticism, and openness (Hampson & Goldberg, 2006). This model cannot be attributed to any single expert or researcher because it was developed over the course of many years based upon the contributions of a large number of individuals (see Chapter 2 for a discussion of its evolution). Numerous studies have found that this model has predictive value for health behaviors and outcomes (Bogg & Roberts, 2004; Kern, Friedman, Martin, Reynolds, & Luong, 2009; Lahey, 2009; Young & Beaujean, 2011), and past researchers have found links between Big Five personality dimensions and various health-related behaviors, including those that increase the likelihood of acquiring HIV infection (Schmitt & Shackelford, 2008; Zietsch et al., 2010).

Overall, there was a substantial amount of evidence to support the use of the Big Five model of personality for the current study. A review of the literature indicated that this model is widely used in personality research, including research focused on personality trait determinants of health-related behaviors, and that it is well respected among researchers in the fields of both personality psychology and health psychology.

The other theoretical framework used to guide this research was Aday's (2001) model of the social determinants of health. According to Aday's framework, all elements that contribute to socioeconomic status (SES) influence health behaviors and outcomes. SES elements encompassed within this framework include individual characteristics such as age, race, and gender; social support from families and communities; and economic determinants such as education and income. All of these factors can contribute to the vulnerability of certain populations to various health risks. According to Aday's model, those at the highest risk for poor health outcomes include younger individuals, African Americans, those who live alone (particularly individuals who are single, separated, divorced, or widowed), those with less education, the unemployed, and poor and low-income individuals. A search of the literature turned up substantial support for Aday's (2001) model and its relevance to the current study.

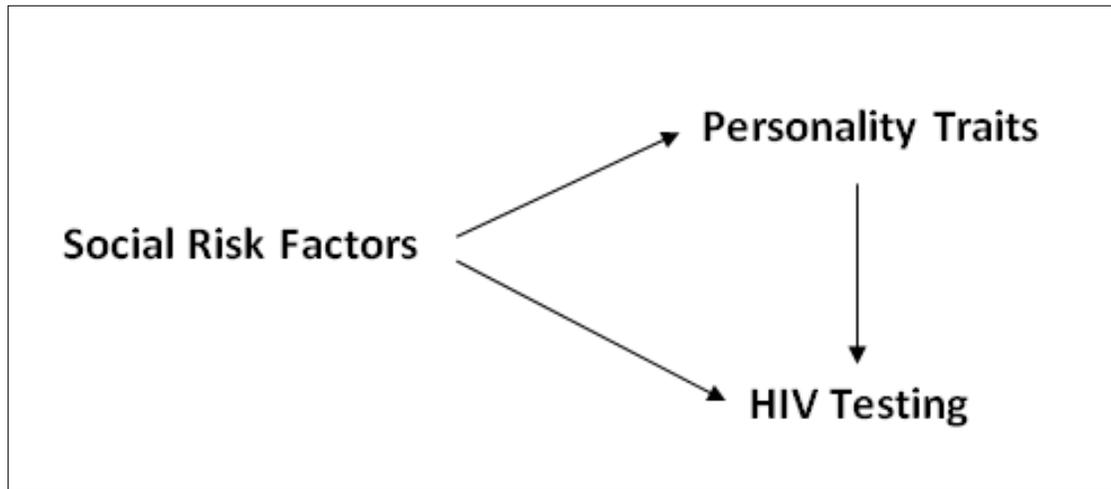
The findings from prior research have provided evidence for the effects of various social factors on health behaviors and outcomes (Ayala et al., 2012; Denning & DiNenno, 2010; Elkington et al., 2010; Halkitis & Figueroa, 2013; Mustanski et al., 2011), and a number of past studies have yielded insights that have particular relevance to the current study. Prior researchers have found that those with less education are less likely to seek HIV testing (Johns et al., 2010; Washington et al., 2013), and that there are a number of social factors that influence the health outcomes of African Americans in particular. African Americans may have negative associations with the medical establishment as a result of past discrimination (Friedman et al., 2009), and they are less likely to access medical services (German et al., 2011). They are also more likely to be unemployed

(Murphy et al., 2009) and to live in poverty (Peterson & Jones, 2009), both of which are critical determinants of health behaviors and outcomes (Aday, 2001). In addition, those who live in poverty are less likely to have access to high-quality medical services (Peterson & Jones, 2009).

There is also substantial evidence for interactive effects among personality traits, social factors, and health outcomes, and these interactions formed the basis for the conceptual model created for this research. These interactive effects and the study's conceptual framework are described in the section that follows.

### **Conceptual Framework**

The conceptual framework for this study encompassed both the Big Five model of personality and Aday's (2001) model of the social determinants of health (see Figure 1). This framework suggests that social risk factors influence HIV testing rates both directly and indirectly (through their influence on personality) and that personality also directly influences HIV testing rates. Support for this model came from the findings of prior research showing that social factors directly influence HIV testing rates (Benavides-Tores, Wall, Rocha, Rodriguez, & Hopson, 2012; Johns et al., 2010), that Big Five traits vary in conjunction with social factors (Donnellan & Lucas, 2008; Jonassaint et al., 2011; Lehmann et al., 2012; Poropat, 2009; Soto et al., 2011; Specht, Egloff, & Schmukle, 2011; Vecchione et al., 2012; Wortman, Lucas, & Donnellan, 2012), and that Big Five personality traits influence health behaviors and outcomes (Bogg & Roberts, 2004; Kern et al., 2009; Lahey, 2009; Young & Beaujean, 2011).



*Figure 1.* Conceptual model.

The social risk factors of interest for the purposes of this research were age, education, income, employment, housing, and marital status. These factors were selected because they are objectively measurable (unlike more nebulous variables such as social support) and because they have been found to vary in conjunction with Big Five personality traits. Big Five trait scores change over the lifespan (Donnellan & Lucas, 2008; Lehmann et al., 2012; Soto et al., 2011), which indicates that age influences personality. Education has also been linked to variations in Big Five personality dimension scores (Poropat, 2009), as have low income, unemployment, and homelessness (Jonassaint et al., 2011). Conscientiousness, one of the Big Five personality dimensions, is also associated with both marital status and health outcomes (Bogg & Roberts, 2004). Because all of these social factors have been linked to both personality and health by past research, they could be considered variables that may influence the HIV testing behaviors of young AAMSM.

### **Nature of the Study**

I used a quantitative methodology because my goal was to identify correlations among variables, which required collecting and analyzing numerical data. The investigation was cross sectional, and data were collected using a questionnaire-based instrument rather than by means of an experimental design because I focused on preexisting social factors and personal characteristics that could not be ethically manipulated. Also, given the focus on social determinants of health, it was necessary to conduct this research within a natural community setting. Although it would have been ideal to conduct a longitudinal study, this was not possible given the limitations of available data on HIV testing and the secretive, transient, and potentially noncompliant nature of the sample population. It would be difficult or impossible to collect good data over time or use a non probability sampling method with this particular population. The fact that the resources available to conduct this research were limited was also a factor in the choice to use a cross-sectional design and a respondent-driven approach to sample selection.

The independent variables for this study were socioeconomic factors defined by Aday's (2001) model of the social determinants of health, which include age, education, income, employment, housing, and marital status, and the Big Five personality dimensions of agreeableness, conscientiousness, extroversion, neuroticism, and openness (Hampson & Goldberg, 2006). The dependent variable was HIV testing rates among young African American men who have sex with men (AAMSM). The focus in this research was not placed on sexual orientation, but instead on sexual behavior. I made this

choice because of the potential that homophobia (including external and internalized homophobia) and stigma associated with sexual orientation labels could prevent participation (Koblin et al., 2006). As participants may not have identified as gay or bisexual, it was important to maintain a focus on behavior. Thus, sexual orientation was not measured.

The sample population for this research was young AAMSM, 18 through 30 years of age, who resided in the United States at the time of the study. The sample was recruited online with the assistance of organizations such as the National Black Gay Men's Advocacy Coalition and Nashville Community AIDS Resources, Education, and Services (Nashville CARES), as well as regional Facebook groups. Instruments used to collect data included the Big Five Inventory (John, 2009), as well a questionnaire designed to collect information regarding social risk factors that I developed for this study based upon Aday's (2001) model of the social determinants of health. Given the number of variables included in this research and the desire to identify correlations and their relative strength and direction, multiple regression analysis was conducted. This enabled me to determine which (if any) of the Big Five personality dimensions and social determinants of health influence HIV testing rates among young AAMSM.

### **Definitions**

*Aday's model:* Aday's (2001) model of the social determinants of health (also referred to as *Aday's framework*) suggests that particular social risk factors influence health behaviors and outcomes.

*Age:* Age is a social risk factor that influences health behaviors and outcomes.

According to Aday's (2001) model, young people and the elderly are the most vulnerable to health problems. Only those aged 18 to 30 were included in this research.

*Agreeableness:* This Big Five personality dimension manifests as consideration, cooperativeness, a tendency to forgive, happiness, helpfulness, kindness, good manners, obedience, a tendency to show sympathy, thoughtfulness, a trusting nature, unselfishness, and warmth. Those who receive low scores on this dimension tend to be cold, aloof, rude, and unsympathetic (Hampson & Goldberg, 2006).

*Big Five model:* This model of personality, variously referred to as *the Big Five model*, *the Big Five personality factors*, *the Big Five dimensions*, or *the five-factor model*, defines personality based on scores for five personality dimensions: agreeableness, conscientiousness, extroversion, neuroticism, and openness (Hampson & Goldberg, 2006).

*Conscientiousness:* This Big Five personality dimension manifests as carefulness, efficiency, a tendency to follow through with things and to be organized, neatness, perseverance, practicality, reliability, common sense, a systematic approach, and thoroughness. Those who receive low scores on this dimension tend to be careless, disorganized, easily distracted, inefficient, irresponsible, lazy, and sloppy (Hampson & Goldberg, 2006).

*Education:* Education is a social determinant of health, according to Aday's (2001) model, given the inverse relationship between education and positive health behaviors and outcomes. For the purposes of this research, education is defined based on

five levels of achievement: no high school diploma; high school graduate; GED, or equivalent; some college; undergraduate degree; and graduate degree.

*Employment:* Employment is a social determinant of health, according to Aday's (2001) model, as unemployment and low-paid employment contribute to adverse health behaviors and outcomes. For the purposes of this research, employment is defined based on four categories: full time (35 hours a week or more), part time (less than 35 hours a week), unemployed, and retired.

*Extroversion:* This Big Five personality dimension manifests as assertiveness, boldness, sociability, gregariousness, outspokenness, social confidence, and the tendency to generate enthusiasm. Those who receive low scores on this dimension tend to be inhibited, quiet, reserved, reclusive, and shy (Hampson & Goldberg, 2006).

*HIV testing:* HIV testing, which was the dependent variable in this study, is defined as either participating in traditional or clinical testing conducted by a healthcare professional or performing a more discreet in-home test to determine whether or not one is infected with the human immunodeficiency virus.

*Housing:* Housing is a social determinant of health, according to Aday's (2001) model, because homelessness or living in substandard housing increases the likelihood of engaging in behaviors that compromise health and of suffering negative health outcomes. For the purposes of this research, housing is defined based on four categories: own current residence, rent current residence, staying with family or friends, and homeless.

*Human capital:* Human capital includes elements critical to socioeconomic status such as housing, jobs, income, and schools (Aday, 2001).

*Income:* Income is a social determinant of health, according to Aday's (2001) model, because lower incomes are associated with risky health behaviors and negative health outcomes. For the purposes of this research, income is defined based on five annual earnings categories: less than \$10,000, \$10,000–\$20,000, \$20,001–\$30,000, \$30,001–\$40,000, and more than \$40,000.

*Marital status:* Marital status is a social determinant of health, according to Aday's (2001) model, because individuals who live alone are more likely to engage in unhealthful behaviors and suffer negative health outcomes. For the purposes of this research, marital status is defined based on six categories: single, never married; committed relationship, not married; married; separated; divorced; and widowed.

*Neuroticism:* This Big Five personality dimension manifests as a tendency to complain, concern with being accepted, higher likelihood of suffering from depression, enviousness, fault finding, fearfulness, fickleness, fidgetiness, fretfulness, lethargy, moodiness, nervousness, quarrelsomeness, restlessness, rigidity, self-centeredness, spitefulness, submissiveness, suspicion, a temperamental nature, tenseness, touchiness, and a tendency to worry. Those who receive low scores on this dimension handle stress well and tend to be adaptable, emotionally stable, not easily upset, not prone to envy, relaxed, and able to remain calm in tense situations (Hampson & Goldberg, 2006).

*Openness:* This Big Five personality dimension manifests as complexity, creativity, curiosity, depth, eccentricity, imaginativeness, ingeniousness, an intellectual focus, inventiveness, originality, perceptiveness, a philosophical nature, self-reliance, sensitivity to aesthetic experiences, and verbal fluency. Those who receive low scores on

this dimension tend to lack creativity and intellectual focus, prefer routine work, and have few (if any) artistic interests (Hampson & Goldberg, 2006).

*Personality:* For the purposes of this research, personality is defined by the scores individuals receive on the Big Five Inventory. These scores indicate whether they are inclined to be more or less agreeable, conscientious, extroverted, neurotic, or open to experience.

*Social capital:* Social capital includes interactive factors such as marital status, family structure, social networks, and voluntary organizations (Aday, 2001).

*Social determinants of health:* According to Aday's (2001) model, the social determinants of health include community factors such as social and economic policies, community resources, and neighborhood social ties, as well as individual determinants of health such as personal resources, social capital, and human capital.

*Social risk factors:* According to Aday's (2001) model, social risk factors that increase the likelihood of suffering from health problems include being young or elderly; female gender; African American, Native American, Asian American, or Hispanic race; living alone; being single, separated, divorced, or widowed; lacking a strong social network; not having completed high school; being unemployed or a blue collar worker; having a low income and living in poverty; and living in substandard housing.

*Socioeconomic status (SES):* Socioeconomic status is one's position or standing in society as a result of various factors such as education, income, age, race, and gender (Aday, 2001).

*Unprotected anal intercourse (UAI)*: An act of sexual intercourse via the anus performed by a man with a man or woman without the use of a condom.

*Young AAMSM*: This abbreviation stands for *young African American men who have sex with men*. For the purposes of this study, *young* is defined as aged 18 to 30. This group is defined without reference to sexual orientation, but is instead defined based on sexual behavior (sexual contact with men, not excluding sexual contact with women).

### **Assumptions**

This research was premised on a number of assumptions. First, I assumed that the Big Five model provides an accurate representation of personality. This assumption was necessary because it is critical to have a model of personality that incorporates measurable elements when one is conducting quantitative research with personality as an independent variable. A review of the literature indicates that there is significant empirical evidence for the predictive value of this model and the generalizability of the results it provides.

Second, I assumed that Aday's (2001) social determinants of health were the critical factors influencing health outcomes. A review of the literature indicated that this model is widely accepted and that it also has significant empirical support.

Third, I assumed that the young AAMSM who participated in this study provided accurate answers to questions regarding personality dimensions, social factors, and HIV testing behavior. Although participants may not have provided honest answers in some cases due to social desirability bias or other factors, maintaining the anonymity of participants increased the likelihood that they answered questions in a forthright manner.

### **Scope and Delimitations**

The scope and delimitations of this research were as follows. First, the sample for this study was confined to young AAMSM (those aged 18 to 30) residing in the United States. This group was defined behaviorally rather than by sexual orientation identification. The decision was made to focus solely on young AAMSM because this is a population at great risk for HIV infection and other studies of MSM have not typically broken out results based on race or examined the influence of age on HIV testing behavior. The choice to focus on a single location was made to avoid concerns regarding equality of access to HIV testing.

Second, this study was confined to a single point in time, given its cross-sectional design. Such designs can be problematic with regard to internal validity. However, threats to internal validity were mitigated by the use of strict selection criteria for the sample. External validity may also be compromised by the use of a non random sample, because inclusion or exclusion of those who matched the selection criteria was decided by potential participants, creating a risk of selection bias. However, a non random sample was the only feasible choice for this research.

Third, this study made use of a single personality theory: the Big Five model. A number of other personality theories could have been used for this study. However, these were rejected in favor of the five-factor model for various reasons. Freud's psychoanalytical theory has been largely discredited (Boyle, Stankov, & Cattell, 1995), giving way to modern theories with a behavioral, cognitive, social learning, or trait focus (McCrae & Costa, 1996). Behavioral, cognitive, and social learning theories suggest

models of personality that do not lend themselves easily to quantitative measurement. Behavioral theories focus on interactions with the environment, which are difficult to assess quantitatively; cognitive theories focus on thought processes, which are also difficult to measure objectively; and social learning theories must take into account all social influences around an individual, which are difficult to quantify as well. Trait theories, by contrast, provide models of personality that enable the scoring of individual trait dimensions along a continuum. It is easy to create quantitative measurement instruments based upon trait models, so they are particularly useful for social research. The Big Five model is not the only trait theory of personality. However, a review of the literature indicates that it is the most widely used and respected trait theory for social research. Furthermore, there is significant empirical evidence of its predictive value for a wide range of behaviors (Cuperman & Ickes, 2009; Fleeson & Gallagher, 2009; John & Srivastava, 1999; Judge, Piccolo, & Kosalka, 2009; Nicholson, Fenton-O’Creevy, Soane, & Willman, 2002; Schmitt & Shackelford, 2008).

Fourth, this study focused on social risk factors specified by Aday’s (2001) model of the social determinants of health. I chose this model because it includes factors that predict HIV risk behaviors such as age (Murphy et al., 2009), income, employment, and housing (Ayala et al., 2013; Elkington et al., 2010; Halkitis & Figueroa, 2013), as well as factors that predict HIV testing such as education (Johns et al., 2010; Washington et al., 2013).

Fifth, although there are many social determinants of health specified by Aday’s (2001) model, this research focused on six variables: age, education, income,

employment, marital status, and housing. These particular social risk factors were selected because they are objectively measurable. Other variables identified by Aday were not included for a number of reasons. Gender and race were not used as variables because the sample for this research included only male African Americans. Family was not included as a variable because, given the age range and sexual orientation of those in the sample population, they were less likely to be living with birth families or to have started their own families than those of other demographic groups. While it is likely that some individuals in the sample lived with their birth families or had families of their own, they were likely to comprise a relatively small proportion of the sample. Participation in voluntary organizations was also not included as a social capital variable because it is difficult to gauge the quality of this participation. An individual may be a member of an organization but rarely if ever participate in its activities, or the individual may engage with the organization on a daily basis. Therefore, this variable was considered too complex to include. The final social capital factor, social networks, was also rejected as a potential variable because assessment of an individual's social network is highly subjective and therefore qualitative. Also, including this variable would have increased the likelihood of social desirability bias, given that individuals may be inclined to represent their social networks as stronger than they actually are.

Given the scope and delimitations of this research, the findings are most applicable to young AAMSM living in the United States. The findings, however, are not generalizable to older AAMSM, MSM of other races, men who do not have sex with men, and women. Moreover, given the study's cross-sectional design, the findings apply

to a particular generation of young AAMSM but may not be as applicable to subsequent generations due to changes in environmental factors occurring over time.

### **Limitations**

This study had a number of limitations. First, because the resources and time available to conduct this research were limited, a cross-sectional design was used. As a result, the findings reflect a single point in time and a single cohort of AAMSM. It is possible that social changes over time and the different experiences of subsequent cohorts may influence the likelihood of HIV testing among young AAMSM in the future. However, threats to validity associated with cross-sectional designs were mitigated to some degree by the use of screening criteria.

A second limitation of this study was its reliance on nonrandom sampling, which can introduce self-selection bias. This research used a purposive selection process, with participants selected based on their personal characteristics (sexual behavior). It is possible that those who chose to participate in this research differed in some way from those who did not, and because participants were encouraged to refer others, the potential for selection bias may have been magnified. Moreover, because recruitment was undertaken using social media, those who did not frequent online communities or were secretive about their sexual activities were less likely to participate in this research, whereas individuals in particular social circles might be overrepresented in the sample. Threats to validity that resulted from the use of a nonrandom sample were mitigated by the use of Response Driven Sampling Coupon Manager (RDSCM) and Response Driven

Sampling Analysis Tool (RDSAT) software and by limiting referrals to two individuals per respondent to reduce the likelihood of overrepresenting particular social groups.

A third limitation of this study arose from the use of social determinants of health as key variables, given that respondents may have defined them differently from the way I defined them. For example, marital status has been traditionally defined as an exclusive legal union between a man and a woman, but young AAMSM may have their own definitions of marriage and assume gender identities that do not match their biological gender. Participants may also have varying personal definitions of high or low incomes and education levels. Limitations associated with different interpretations of social determinants were addressed by using clearly defined categories on the questionnaire.

A fourth limitation of this research arose from the use of a self-report instrument. Although this was the only means by which the required data could be gathered, it did create a risk of introducing bias. While it was impossible to eliminate the risk of bias completely, validity concerns were addressed by conducting a pretest with expert review to assess the validity of the instrument and making changes as necessary.

### **Significance**

A high prevalence of HIV infection combined with a low rate of HIV testing increases the likelihood that individuals will infect others. Therefore, unrecognized HIV infection represents a significant public health threat. Young AAMSM are particularly likely to be infected (Fields et al., 2012), and AAMSM are more likely to avoid HIV testing (Magnus et al., 2010) than those of other demographic groups. Therefore, it is critical to identify the factors that decrease the likelihood of testing among members of

this population. The findings from this research are of academic interest to those who study issues surrounding personality, social factors, and health behaviors and outcomes. However, they are also of use to those involved in the development of public health policies and strategies.

Given that sexual risk behaviors are common among young AAMSM (Murphy et al., 2009) and testing rates remain relatively low (Magnus et al., 2010), it is obvious that current public health approaches have failed with this group. Prior research has shown that health behaviors and outcomes are influenced by Big Five personality traits (Schmitt & Shackelford, 2008; Takahashi et al., 2012; Zietsch et al., 2010) and social factors (Aday, 2001). Therefore, the findings of a study identifying the personality traits and social factors that contribute to lack of testing among young AAMSM could potentially inform policy approaches and the development of individual strategies for increasing testing among members of this high-risk group. This would, in turn, reduce the prevalence of unrecognized HIV infection and, by extension, the spread of HIV infection overall, as those who are aware of their status can take precautions to reduce the risk of infecting others. However, this research has broader social change implications beyond the potential for increasing HIV testing among members of a high-risk group. Many African Americans distrust the current medical establishment due to its legacy of systemic discrimination (Friedman et al., 2009). By supporting the development of better approaches to HIV prevention and diagnosis, the findings from this research may contribute to the enhancement of services available to young AAMSM, potentially

increasing their engagement with the medical system and promoting better health outcomes for this high-risk population.

### **Summary**

Young AAMSM are at higher risk for acquiring HIV infection than those of other demographic groups, and they are also less likely to seek HIV testing. As a result, the prevalence of unrecognized HIV infection is high in this population, which in turn increases the likelihood that HIV-positive individuals will infect others. To address this public health threat, it is important to determine why young AAMSM are less likely to seek HIV testing so that better strategies can be developed to encourage testing among members of this high-risk group. Because prior research suggests that both personality and social factors influence health-related behaviors, the conceptual framework developed for this study was based upon two widely used and respected theoretical frameworks: the Big Five model of personality and Aday's (2001) social determinants of health. Factors specified by these models were used as independent variables in this research, and their effects on the dependent variable, HIV testing, were evaluated to determine which elements significantly influence the likelihood of HIV testing among young AAMSM in the United States. Because it yielded insights that could be used to encourage HIV testing among members of this vulnerable population, this research has significant implications for public health policy and the development of public health services.

The chapter that follows provides a detailed overview of the theoretical foundations on which this research was based, as well as the ways in which these

theoretical frameworks are linked to health-related behaviors, particularly those associated with HIV risk and the likelihood of HIV testing. The methodology for this study is presented in Chapter 3, findings and analyses are detailed in Chapter 4, and conclusions and recommendations are provided in the final chapter.

## Chapter 2: Literature Review

### **Introduction**

The HIV prevalence rate among African American men who have sex with men (AAMSM) is almost 20 times higher than that of other racial groups (Morris et al., 2006), and young AAMSM (those between 15 and 22 years of age) are 5 times more likely than those of other racial groups to acquire HIV infection (Fields et al., 2012). HIV infection is spreading far more rapidly in African American communities than in the communities of any other racial group in the United States (Friedman, Cooper, & Osborne, 2009). Although there was no significant change in overall HIV prevalence in the United States between 2006 and 2009, rates of infection among young AAMSM increased by 48% during that period (Prejean et al., 2011). Furthermore, this demographic group currently suffers from the highest rate of HIV infection in the United States (Fields et al., 2012).

Young African Americans most often follow a sexual behavior risk trajectory whereby risk increases during adolescence and decreases later on (Murphy, Brecht, Herbeck, & Huang, 2009). Recent research indicates that AAMSM are no more likely to engage in risky sexual behaviors or to abuse drugs than individuals belonging to other racial or ethnic groups (Friedman et al., 2009; Millet, Flores, Peterson, & Bakeman, 2007) or are even less likely to report taking risks than MSM of other races (Magnus et al., 2010; Tieu, Murrill, Xu, & Koblin, 2010). However, past researchers have found higher rates of unprotected anal intercourse (UAI) among AAMSM (Millet et al., 2007). Although disparities in past sexual risk taking may account for some portion of the current discrepancies in rates of HIV infection (Millet et al., 2007), there is evidence that

racial differences in infection rates are partially attributable to socioeconomic issues, given that African Americans have higher rates of unemployment (Murphy et al., 2009) and incarceration (Bland et al., 2012) and are more likely to live in poverty (Peterson & Jones, 2009).

AAMSM are less likely to pursue HIV testing or disclose their MSM status to their health care providers than those of other races (Magnus et al., 2010), which increases their risk of having unrecognized HIV infection and infecting others. Magnus et al. (2010) suggested that a lack of disclosure and testing rather than traditional sexual risk factors may therefore result in higher rates of HIV infection among AAMSM. According to German et al. (2011), by 2004–2005, the incidence of unrecognized HIV infection was 63.8% for AAMSM, compared to 15.4% for non-Hispanic White MSM; by 2008, the rate of unrecognized infection was 76.9% for AAMSM and 47.4% for White MSM. Although the rate of unrecognized HIV infection has risen more sharply among White MSM, it is still well below that of AAMSM. The authors noted that younger MSM are more likely to have unrecognized HIV infection than older MSM, which indicates that young AAMSM have the highest prevalence rate of unrecognized HIV infection among the demographic subgroups of MSM.

Given the dearth of research exploring personality influences on the testing behaviors of young AAMSM, investigators know little about personality-related facilitators and impediments to testing for this high-risk group, or what could be done to increase the likelihood that members of this demographic will seek HIV testing. This is a serious problem, given that individuals who are HIV-positive and unaware of their status

are far more likely to engage in dangerous sexual behaviors that put others at risk (Lansky et al., 2010; Mermin, 2010). Therefore, lack of testing among young AAMSM is a significant public health issue.

Young AAMSM are a high-risk population for whom regular HIV testing is critical. However, a review of the literature indicates that they are less likely to seek testing, and that prior research examining the underlying causes of this discrepancy has been fragmented and inconclusive. Past researchers have not attempted to apply a unifying theoretical framework in their examination of the socioeconomic causes of racial HIV testing discrepancies, a problem that this research sought to remedy. By providing a more comprehensive understanding of the factors that influence HIV testing rates among young AAMSM, the findings of this study could potentially inform the development of effective recruitment strategies designed to increase testing among this high-risk group.

The purpose of this research was to identify the socioeconomic and personality factors that influence HIV testing among young AAMSM. The theoretical frameworks used to support this research included Aday's (2001) model of the social determinants of health and the Big Five model of personality, which encompasses five personality dimensions: agreeableness, conscientiousness, extraversion, neuroticism, and openness (Hampson & Goldberg, 2006). Aday's (2001) framework, which is examined in depth in the section that follows, encompasses all of the elements that contribute to socioeconomic status (SES), including social support at the family and broader community levels; economic elements such as education and income; and individual characteristics such as

age, race, and gender. The Big Five model of personality was chosen as the unifying framework for this research because prior studies indicate that personality, which arises from a complex interplay of genetic and social influences, has a strong effect on HIV-related health-related behaviors (Bogg & Roberts, 2004; Charnigo et al., 2013; Mehrotra, Noar, Zimmerman, & Palmgreen, 2009; Schmitt & Shackelford, 2008; Turchik, Garske, Probst, & Irvin, 2010; Zietsch et al., 2010). Therefore, this model has the potential to explain why some individuals seek HIV testing while others avoid it.

The literature search for this study involved a number of databases. Although Google Scholar was the primary source of the peer-reviewed journal articles cited in this literature review, sources were also drawn from the Academic Search Complete, PsycINFO, MasterFILE Premier, ProQuest Central, SAGE Premier, Science Full-Text Select, PubMed, Medline, and CINAHL Plus databases. Search terms used included various combinations of the following: *age, socioeconomic status, social determinants of health, income, education, SES, health behavior, self-protection, personality, Big Five, five-factor, agreeableness, conscientiousness, extraversion, neuroticism, openness, HIV infection, HIV testing, men who have sex with men, MSM, African American, race, African American men who have sex with men, young African American men who have sex with men, AAMSM, and young AAMSM*. This search yielded 129 sources suitable for inclusion in the literature review.

Although some older sources were included to provide a historical overview of personality theory development and the evolution of the Big Five model (as well as its predictive value for various health behaviors), recency was a key inclusion criterion for

sources that focused on Aday's SES factors, the influence of personality on HIV-related behaviors, and HIV testing rates among young AAMSM. The majority of studies included in this literature review took place between 2009 and 2013 and were conducted in the United States or comprised meta-analyses of North American studies, though a couple of international studies of particular relevance were included as well.

The literature review that follows is divided into three sections. The first examines key concepts and variables related to social determinants of health and HIV-related behaviors using Aday's social determinants of health as a guiding theoretical framework. The second explores personality theories with a particular focus on applications of the Big Five personality model in relation to social factors, health behaviors, and HIV testing. The final section presents the conceptual model that has been used to guide this research.

### **Aday's Social Determinates of Health**

The Aday framework is grounded in social epidemiology theory, which hypothesizes a cause-and-effect relationship between political/economical inequalities and social health inequalities (Krieger, 2001). As can be seen from Figure 2, Aday (2001) provided a framework for assessing community and individual determinants of health. At the community level, key determinants of health arising from social and economic policy include community resources and neighborhood social ties, while at the individual level, personal resources, social capital, and human capital are all critical health determinants. *Social capital* includes interactive elements such as marital status, family structure, social networks, and voluntary organizations, and *human capital* includes housing, jobs,

incomes, and schools, elements that are critical to SES. Community-oriented health policy addresses vulnerable populations whose individual members are susceptible to harm and neglect, while medical care and public health policy will be ideally tailored to meet both community and individual health needs encompassing the physical, psychological, and social realms. The elements within the model interact in various ways to produce community and individual health and wellbeing outcomes.

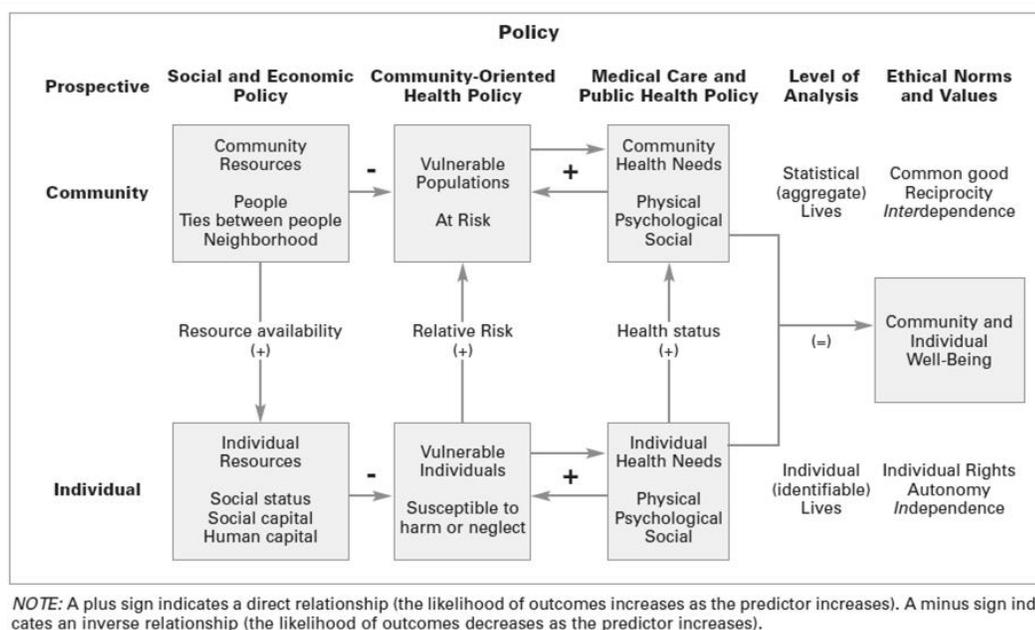
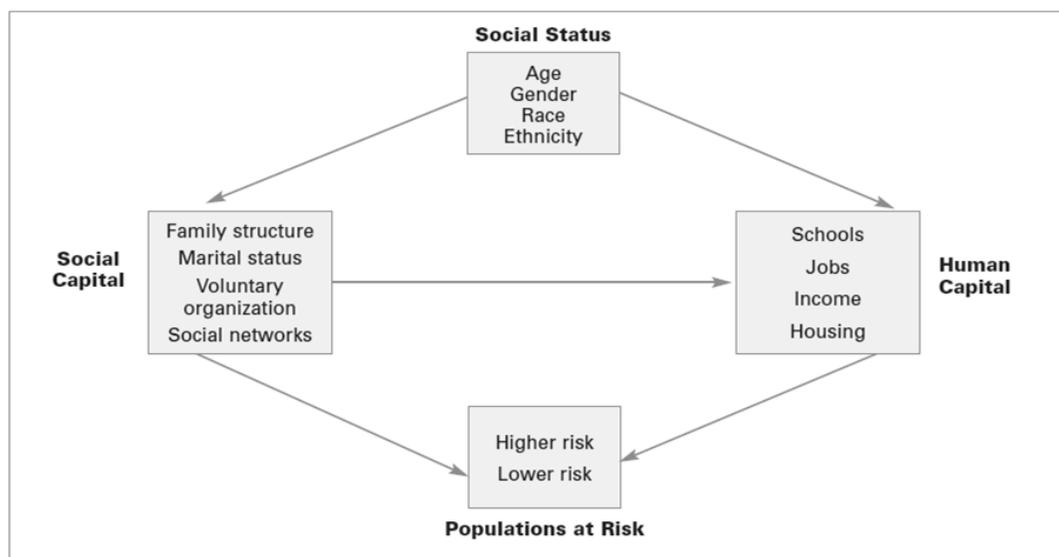


Figure 2. Policy and vulnerability. From *At Risk in America: The Health and Health Care Needs of Vulnerable Populations in the United States* (p. 3), by L. A. Aday, 2001, San Francisco, CA: Jossey-Bass. Reprinted with permission.

Figure 3 shows Aday's (2001) model for predicting which populations will be at risk in terms of health and general wellbeing. Factors that influence social status such as gender, age, and race or ethnicity affect both the human capital and social capital available to individuals and broader communities. Social capital also directly influences

human capital factors, and both are direct determinants of risk. This means that factors such as gender, age, and race or ethnicity indirectly influence the vulnerability of populations via their effects on social and human capital.



*Figure 3. Predictors of populations at risk. From *At Risk in America: The Health and Health Care Needs of Vulnerable Populations in the United States* (p. 7), by L. A. Aday, 2001, San Francisco, CA: Jossey-Bass. Reprinted with permission.*

Table 1, adapted from Aday (2001, p. 9), shows the outcomes of social determinants of health in terms of at-risk populations. Individual-level factors that increase vulnerability include being very young or elderly, female, and of a minority race. With regard to social capital, the most vulnerable populations include those who live alone (single, separated, divorced, or widowed) or head families as single parents (particularly female single parents) and who lack strong social networks and do not participate in voluntary organizations.

Table 1

*Comparison of Relative Risk*

Community and individual resources	Higher risk	Lower risk
	The people: Social status	
Age	Infants, children, adolescents, elderly	Working-age adults
Gender	Female	Male
Race/ethnicity	African American, Hispanic, Native American, Asian American	White
	The ties between people: Social capital	
Family	Living alone, female head	Extended, two-parent
Marital status	Single, separated, divorced, widowed	Married, mingles
Voluntary organizations	Nonmember	Member
Social networks	Weak	Strong
	The neighborhood: Human capital	
Education	Less than high school	High school and beyond
Jobs	Unemployed, blue collar	White collar
Income	Poor, low income	Middle to high income
Housing	Substandard	Adequate or better

*Note.* Adapted from *At Risk in America: The Health and Health Care Needs of Vulnerable Populations in the United States* (p. 9), by L. A. Aday, 2001, San Francisco, CA: Jossey-Bass. Adapted with permission.

As would be expected, neighborhood-level determinants of vulnerability include low education levels, poorly paid jobs or unemployment, general poverty, and substandard housing.

As the focus of my research was young AAMSM, key aspects of Aday's (2001) theoretical framework used to guide this study included age, race, and elements of SES. SES components of interest included human capital factors such as education, employment, and income, as well as social capital factors such as family and social networks.

### **Key Concepts and Variables for Social Risk Factors**

Key concepts for this research included the supposition that social risk factors can affect HIV testing rates both directly and indirectly via effects on personality. According to Aday's (2001) model of social vulnerability, there are a number of social factors that influence health-related behaviors and outcomes. Those of interest to me included factors that affect social status such as age and race; human capital factors such as employment, income, housing, and education; and social capital factors such as family support, social networks, and other supportive social elements within the broader community.

### **Social Status Factors and HIV-Related Health Behaviors**

Social status is a key determinant of health (Link & Phelan, 2010). In addition to human capital and social capital, factors that contribute to social status—and by extension, health behaviors and outcomes—include age and race (Aday, 2001).

**Age.** Age is a critical determinant of social status, which in turn indirectly influences health outcomes (Aday, 2001). In the United States, those under 25 years of

age account for up to 30% of all cases of HIV infection (Morris et al., 2006). Murphy et al. (2009), who studied HIV risk trajectories over the lifespan, identified four trajectory types. They characterized the first trajectory, identified as *high risk*, according to consistently elevated risk levels, with risk increasing throughout early adulthood and declining moderately thereafter. The second pattern, *decreased risk*, involves a short duration of increase during the teen years and a long decrease later on. The third trajectory type, *increased risk*, begins with a slow increase that accelerates into the late teens and then declines slightly starting in early adulthood. The fourth pattern, *low risk*, refers to consistent avoidance of high-risk behaviors over the lifespan. Each of the first three trajectories identifies either adolescence or early adulthood as the period of peak risky sexual behavior. No studies have identified lifespan trajectories in which sexual risk behaviors increase in later years. Murphy et al. (2009) also found that the average age of those who report having unprotected sex with multiple partners is 17.6. These findings indicate that young people are at heightened risk for HIV infection compared to their older counterparts, which is consistent with the findings of a comprehensive research review conducted by Mustanski et al. (2011). These researchers found that younger MSM are more likely to have unprotected anal intercourse (UAI) not only with their primary partners, but also with individuals outside of their relationships.

Murphy et al. (2009) found that young African Americans most often follow a sexual behavior risk trajectory whereby risk increases during adolescence and decreases later on, which suggests that young AAMSM have a higher risk for infection than their older counterparts.

Sexual risk behaviors most commonly associated with HIV infection among young AAMSM include engaging in sex with an older male partner, having UAI with casual partners, and giving in to partners who do not want to wear condoms (Oster et al., 2011).

Age related status differences between partners among AAMSM may also contribute to risky sexual behaviors. In particular, when there are power differentials wherein one partner is younger or less masculine than the other, the less dominant partner often feels too intimidated to demand that the dominant partner use a condom (Fields et al., 2012). This increases the risk of HIV infection for the younger AAMSM, especially in light of Joseph et al.'s (2011) findings that young AAMSM with older partners are more likely to engage in UAI and to have unrecognized HIV infection (2012). Older partners are more likely to be HIV positive than younger MSM (Mustanski et al., 2011) and the tendency of young AAMSM to select older partners (Tieu et al., 2010) exacerbates their risk.

Millet et al. (2007) reported that unrecognized HIV infection is 7 times more common in AAMSM than their White counterparts, and diagnosis of HIV infection in AAMSM more often occurs once the disease has progressed to a later stage, which indicates that younger AAMSM are more likely to delay testing. Unfortunately, the authors did not break the results down by age, so it is impossible to say whether the tendency to delay or avoid testing is more common among particular AAMSM age groups. However, researchers have given evidence to show that a relatively low

percentage of young HIV positive MSM of all races are aware of their status (Mustanski et al., 2011), which indicates that youth is also a factor in the failure to test for HIV.

Washington et al. (2013) found that AAMSM who engage in receptive UAI, seek sex over the Internet, or have less knowledge about HIV are less likely to undergo HIV testing. Unfortunately, in this study, the researchers did not break down the testing rates by age; however, because that they recruited the survey respondents at clubs, bars, and gay pride events, as well as via online advertisements, the sample was likely skewed toward a relatively youthful population.

**Race.** There is evidence that race influences socioeconomic status, with African Americans being particularly vulnerable to negative health outcomes (Aday, 2001). African Americans are more likely to live in poverty (Peterson & Jones, 2009) and to have a history of incarceration, which may be either a function or a cause of low social status and human capital, and which increases the risk of HIV infection among AAMSM (Bland et al., 2012).

Friedman et al. (2009) cited a number of reasons why African Americans may avoid participating in certain aspects of medical care and HIV testing. These include the nation's history of medical mistreatment and medical apartheid, and the theory that the government developed AIDS to kill Black people.

German et al. (2011) reported an association between not having visited a doctor in the prior year and unrecognized HIV infection among MSM, which indicates that AAMSM are at heightened risk due to their lower usage of medical services. The findings of Peterson's and Jones's (2009) comprehensive research review indicated that

AAMSM are less likely to use outpatient health services, have access to private clinics, relay their health concerns to healthcare providers, report satisfaction levels with medical providers, trust the competence and quality of their physicians or the medical services they receive as outpatients, and receive ideal levels of antiretrovirals in the case of HIV infection. The authors noted that these issues (all of which may affect HIV testing rates) might be attributable to human-capital-related health disparities rather than racial factors (Peterson & Jones, 2009). High rates of incarceration among AAMSM (Bland et al., 2012) may also contribute to differences in health care utilization both directly and indirectly via other human capital and social capital variables.

Mehrotra et al. (2009) found that young AAMSM perceived the risk of HIV infection to be greater than their White counterparts. This is evident in the fact that 32.1% of young, sexually active African Americans report consistent condom use compared to just 17.8% of White and 17.6% of Hispanic young people (Murphy et al., 2009). However, according to Eaton, Kalichman, and Cherry (2010), AAMSM reported being less likely to avoid UAI with partners whose HIV status is unknown or different from their own. The authors suggested that these riskier partner selection strategies may contribute to differences in HIV prevalence rates between White MSM and AAMSM. However, they also noted that the African Americans in the study sample were younger on average than the White participants, so it is possible these differences in sexual risk taking stemmed from age rather than race. Notably, a study of five major U.S. cities demonstrated that the majority of HIV transitions among MSM occurred between primary sex partners (Sullivan, Salazar, Buchbinder, & Sanchez, 2009). This indicates

that sex with casual partners may be less of a risk factor for MSM than previously suspected, given that they may be less likely to take sexual risks with strangers or acquaintances than with well-known partners.

Eaton et al. (2010) conducted a study of HIV risk and sexual selection among Black and White MSM. The authors mentioned that in their study population, AAMSM were on average significantly younger, less educated, lower earning, and less likely to be in committed relationships than their White counterparts. Both races were equally likely to have abused drugs and White MSM were more likely to have used alcohol. The differences between the two races within a single sample population recruited from the same venues, along with the high rates of poverty among young AAMSM (Peterson & Jones, 2009), indicated that young AAMSM are more likely to be low in human capital; thus, issues such as affordability and lack of access to testing may be particularly relevant for this demographic group.

### **Human Capital Factors and HIV-Related Behaviors**

Human capital factors include employment, income, housing, and education level (Aday, 2001). The extent to which individuals are able to avoid risks, both directly and indirectly, and thus protect their health, depends to some extent on the money and knowledge they have at their disposal (Link & Phelan, 2010).

**Employment and income.** SES, whose measures typically include human capital variables such as education, occupation, and income, is a reliable predictor of physical health (Matthews & Gallo, 2011). This is unsurprising, given that low SES disadvantages individuals in terms of wealth, power, status, information, and supportive social

interactions (Link & Phelan, 2010). Low human capital may affect health in a number of ways. It subjects individuals to high levels of stress, alters their brain chemistry and structure, and limits their social capital resources (Matthews & Gallo, 2011). Individuals rich in human capital (money, jobs, and education) tend to live in affluent neighborhoods, establish positive relationships, and work at jobs that support good health behaviors and outcomes (Link & Phelan, 2010). In contrast, living in impoverished neighborhoods increases the likelihood that individuals will engage in risky health behaviors. Young people living in low-income neighborhoods may experience greater peer pressure to engage in risky behaviors and often have limited access to health testing services and preventative medical care (Pampel, Krueger, & Denney, 2010). Lack of access to health services such as private clinics and high-quality physicals and medical services has been reported as a particular barrier to HIV prevention and care for AAMSM (Peterson & Jones, 2009). In addition, Rizkalla, Bauman, and Avner (2010) found a greater likelihood for condoms to be inaccessible (kept in locked cases or behind counters) at sales venues in low-income/high-HIV-prevalence areas, contributing to an increased risk of unprotected sex.

According to Pampel et al. (2010), many studies have shown that individuals living in areas where human capital tends to be lacking are more inclined to engage in risky health behaviors such as smoking, eating unhealthy food, avoiding exercise, and becoming obese. Although investigators have not demonstrated clear support for any particular mechanism that makes impoverished individuals more vulnerable to engaging in bad health habits, Pampel et al. (2010) listed a number of existing theories. Some

researchers have speculated that people who live in low-SES environments cope with stress and self-medicate for unhappy moods by using intoxicating substances. Others have suggested that risky health behaviors are compulsive actions resulting directly from the stress posed by low-human-capital environments and lifestyles. Both theories imply that those living in poverty have a great need to relieve stress and limited means by which to do so.

Pampel et al. (2010) further noted that low-income individuals may have less to gain by denying themselves pleasure in the present to invest in future longevity or current productivity, given their limited daily and lifetime earnings potential. Furthermore, they may even have little to gain in terms of health. For example, a person who works in an industrial setting where she is regularly exposed to toxic fumes may feel that quitting smoking will not do her much good. The authors suggested that individuals living in areas with low human capital might also engage in risky behaviors to distinguish themselves from other groups and portray an image of toughness, independence, and freedom from conventional restrictions. In addition, given the higher rates of risky health behaviors in low-income areas, there is likely to be greater peer pressure to adopt such behaviors (or lack of peer pressure to avoid them). Regardless of the underlying mechanism or mechanisms that render those in low-income neighborhoods more prone to taking risks with their health, the authors assert that approximately 25% of the average difference in health between high-SES and low-SES individuals is attributable to health-related behaviors.

There is an inverse correlation between human capital and HIV prevalence rates in the United States (Denning & DiNenno, 2010), which is likely attributable to increased sexual risk taking in low-SES neighborhoods. Ayala, Bingham, Kim, Wheeler, and Millet (2012) found that financial hardship predicts the likelihood of engaging in UAI with a partner whose HIV status is either unknown or different from that of the study respondent. In a study of African American youth, Bauermeister et al. (2009), found associations between a number of low-human-capital factors and risky sexual behaviors. The authors noted that number of sexual partners correlates inversely with grade point average (although SES in general does not correlate directly with number of partners). Low academic achievement is also associated with inconsistent condom use, as is work intensity. In other words, young people who work more hours per week exhibit a greater inclination to use condoms inconsistently. This finding may reflect low human capital in some cases, as young people living in constrained economic circumstances may be under more pressure to earn money. Work intensity is also associated with larger age gaps between young female respondents and their male sexual partners, which is an additional risk factor for HIV and other sexually transmitted diseases.

A meta-analysis conducted by Millet et al. (2012) showed that although AAMSM experience significantly greater SES-related structural barriers that increase their HIV risk (including low income, unemployment, prior incarceration, and less education) compared to MSM of other races, they are actually more inclined to report engaging in HIV prevention strategies. In contrast, Halkitis and Figueroa (2013) reported that perceived low SES correlates significantly with the likelihood of engaging in high-risk

sexual behaviors among young MSM in the United States. Based on these findings, the authors suggested that although race has typically been the focus of such studies, researchers need to pay more attention to elements of SES as risk factors for HIV infection.

It is unsurprising that low human capital is associated with an increased likelihood of engaging in risky health behaviors, given that low-SES environments are typically more stressful, and researchers have linked psychological distress with increased sexual activity and number of partners, as well as decreased condom use (Elkington, Bauermeister, & Zimmerman, 2010). The fact that unemployment is higher among African Americans between the ages of 15 and 25 than youth subpopulations of other races (Murphy et al., 2009) indicates that human capital factors interact with social status factors such as age and race.

Researchers have also found significant socioeconomic disparities in rates of HIV testing. MacKellar et al. (2011) found that structural barriers prevent many MSM from pursuing HIV testing and Mimiaga et al. (2009) identified test access and affordability as potential barriers. In their study of young African Americans, Johns et al. (2010) found that low-income individuals and those lacking high school diplomas are less likely to test in areas with high HIV prevalence rates. The researchers also noted that females are more inclined to test than males, particularly in economically disadvantaged areas, although there is a less pronounced difference in areas where HIV prevalence is high. Given studies showing that, on average, females tend to be more conscientious (Schmitt et al., 2008) and that conscientiousness is correlated with a decreased likelihood of engaging in

risky health behaviors (Bogg & Roberts, 2004; Shakelford, 2008; Terracciano, Löckenhoff, Crum, Bienvenu, & Costa, 2008), this finding is unsurprising. Failure to test for HIV is a serious problem because individuals who are unaware of the fact that they are HIV positive are more likely to engage in sexually risky behaviors than those who have received a diagnosis (Lansky et al., 2010).

In the case of HIV, there is evidence that those at the upper end of the income scale are also less likely to pursue testing. Pisculli et al. (2011) found that individuals with annual household incomes in excess of \$50,000 had a greater tendency to refuse HIV testing in an emergency department. The authors noted that refusal to test is higher among those who feel that they are at lower risk for HIV infection, and suggested that high-income individuals perceive their risk for infection as low. Millet et al. (2010) also found lower testing rates among those earning incomes moderately higher than the sample overall. MSM who participated in the study were at least 18 years of age, but the researchers did not factor the results by age, so the proportion of the sample comprising young MSM is unknown.

**Housing.** Lack of housing also influences the likelihood of engaging in high-risk sexual behaviors by limiting choice. Friedman et al. (2009) and Mustanski et al. (2011) found that those living in poverty were more likely to be financially dependent on high-risk partners, or to trade sex for money, food, or shelter. Young MSM are at greater risk for homelessness than other youths because many are forced to leave their family homes due to homophobia, which increases the likelihood that they will engage in sex work or survival sex (Mustanski et al., 2011). Mutchler et al. (2011) found that condom use

among young MSM correlates inversely with homelessness. However, Young and Rice (2010) found that the effects of homelessness on the likelihood of sexual risk taking can be mitigated to some degree via supportive social networks that encourage safe sex.

**Education.** Education is a key aspect of human capital (Aday, 2001), and there is plenty of evidence that it has a profound influence on health behaviors and outcomes, including those associated with HIV infection. A research review conducted by Cutler and Lleras-Muney (2010) found that education correlates positively with moderation in alcohol consumption, control of drug use, healthy body weight, safe driving, preventative health behaviors, and health testing.

In their study of AAMSM, Hampton et al. (2013) found that lower educational levels are associated with increased likelihood of having unprotected sex, while Kogan et al. (2011) found that academic engagement encourages young African Americans to evaluate risk-taking peers more negatively (Kogan et al., 2011). Washington et al. (2013) demonstrated that level of education is correlated with HIV testing among AAMSM in that those with less education are less likely to have been tested.

### **Social Capital Factors**

Social capital factors include family influence, social support and acceptance, social networks, and broader community ties (Aday, 2001). A review of the literature indicates that there is a significant amount of evidence for the influence of social capital factors on the HIV-related behaviors of AAMSM. Many impoverished young MSM lack awareness of, or access to, organizations that offer free condoms (Mustanski et al., 2011),

which suggests a lack of social support within the community through which young MSM could obtain this information.

Researchers have presented evidence that peer networks can influence sexual risk taking among young AAMSM. Peterson, Rothenberg, Kraft, Beeker, and Trotter (2009) found a link between low approval for condom use among associates and sexual risk taking, whereas perceived social norms that favor condom use have a protective effect. Although peers have the most significant influence on adolescent health behaviors (Umberson, Crosnoe, & Reczek, 2010), religious activity also appears to have a protective effect against sexual risk taking (Murphy et al., 2009).

Ayala et al. (2012) showed that factors linked to increased UAI included concerns regarding homophobia, racism, and lack of social support. In an attempt to explain the higher rates of undiagnosed HIV infection among African American and Latino MSM, Millet et al. (2011) recruited MSM in various U.S. cities to participate in their research, which included HIV testing. They found associations between unrecognized HIV infection in AAMSM and a number of factors, including identifying as gay, which indicates that homosexual MSM are inclined to avoid testing for social reasons.

There is a significant amount of evidence indicating that AAMSM are less likely to seek HIV testing than MSM of other races, and that they are more likely to have unrecognized HIV infection (Outlaw et al., 2010). Marsh, Reynolds, Rogala, Fisher, and Napper (2010) found that African Americans of all sexual orientations are more likely to refuse rapid HIV testing conducted in mobile vans or other public community-based settings. Sharma, Sullivan, and Khosropour (2011) found that AAMSM are more likely

to take a private home HIV test if offered. Among those who refused, the reasons given included a preference for communicating with a counselor face to face when testing, not wanting to give their mailing address in order to receive a testing kit, concerns regarding the accuracy of home test kits relative to tests administered in clinical settings, and worry that others might see the test kit. Notably, this research focused on a hypothetical HIV test, and in some cases, a small monetary incentive was included. Furthermore, the age range for the study was 18 and older and the researchers did not categorize the results by age. Thus, it is impossible to say whether or not age was a factor in the likelihood of accepting a private, take-home HIV test. However, the results provide strong evidence for social concerns.

Given that some African American men avoid HIV testing due to the perceived risk of being ostracized within their communities, or refuse to use condoms because it is seen as un-masculine or evidence of infidelity (Brooks, Etzel, Hinojos, Henry, & Perez, 2005), low testing rates among AAMSM are likely attributable to concerns regarding social acceptance. Evidence of lack of social acceptance comes from the fact that many young MSM are forced out of their homes due to homophobia (Mustanski et al., 2011).

There is also evidence that supportive social networks can increase testing rates. Lauby et al. (2012) found that having supportive social networks increases the likelihood of seeking HIV testing among AAMSM, as well as reducing the likelihood of both risky sexual behavior and unrecognized HIV infection. The authors suggested a number of pathways by which social support may operate to increase the likelihood of testing and reduce the risk of HIV. First, those in their support network may encourage a high-risk

individual to learn his HIV status. Second, those who have good social networks may feel less afraid of potential rejection associated with a positive diagnosis. Third, individuals who establish good social connections are more likely to be psychologically healthy and socially engaged. Although a significant proportion of the sample in the research conducted by Lauby et al. (2012) was composed of young AAMSM, the findings were not broken down by age, so they did not shed light on whether social support is more critical to HIV testing among younger or older AAMSM.

In a study of HIV testing among AAMSM conducted by Mimiaga et al. (2009), it was demonstrated that when tests were sought, typical reasons included personality factors such as conscientiousness (the desire to know one's status for self-care reasons) or the tendency to worry (fear about infection after engaging in risky sex, concern due to symptoms of illness or finding out that a prior sex partner is HIV positive), and social support factors such as encouragement from healthcare personnel, friends, or partners, or the requirements of military service, a drug program, jail, employment, or an insurance provider. Nearly all of those tested reported positive perceptions of HIV testing, although a few complained about cold, distant, or judgmental staff, or a failure on the part of testers to provide adequate explanations or counseling. As for the many AAMSM who have never sought HIV tests, reasons for avoiding testing include the belief that they are at low risk for infection and fear of learning that they are HIV positive. One subject also expressed concerns about privacy. These findings suggested that low risk perception and fear are the primary forces driving test avoidance among AAMSM. Unfortunately, the results were not categorized by age group.

More evidence for the protective nature of increased access to social resources comes from a study of inner-city youth conducted by Kogan et al. (2011), who found that protective parental influences increase the likelihood of academic engagement, which in turn encourages young African Americans to evaluate risk-taking peers more negatively, thereby reducing their predisposition to engage in risky sexual behaviors. Moreover, Murphy et al. (2009) found that supportive parenting and young people's belief that peers do not engage in risky sexual activities also reduced their likelihood of sexual risk taking.

A study of homeless youth who use social networks conducted by Young and Rice (2010) found that those who engage in sex-related conversations are more inclined toward risky sexual behaviors, but those who use the networks to talk about safe sex are less likely to engage in risky sexual behaviors and more likely to get tested for HIV and other sexually transmitted diseases. However, we cannot assume that those who use social networks are naturally extraverted. Given Klein and Cook's (2010) finding that extraverts are less inclined to prefer online medical services, it is possible that introverted youth rather than extraverts will socialize online.

It should also be noted that personality factors interact with social capital factors to influence HIV testing rates. MacKellar et al. (2011) identified perceived risk and fear of a positive result as drivers of HIV test avoidance among MSM, particularly AAMSM, and other studies have demonstrated that testing is less likely when perceived risk of infection is low (Mimiaga et al., 2009; Pisculli et al., 2011).

### **Summary of Social Risk Factors**

Table 2 below provides a summary of the social status and human capital factors that increase the likelihood of sexual risk taking and HIV test avoidance, as well as their interactive effects with personality dimensions. Table 3 summarizes social capital risk factors and protective factors in relation to personality factors.

#### **Limitations of Prior Research on Young AAMSM and HIV Testing**

Existing research on risky sexual behaviors and HIV testing among AAMSM suffers from a number of limitations. First, few prior researchers categorized their results by age, and some have not grouped the results by race or sexual orientation either. When past researchers provided demographic breakdowns of their results, they tended to focus on either age or race, but not both at once. Furthermore, many studies focused on substance abusers, individuals with personality disorders or mental health problems, criminals, and other groups not representative of typical young AAMSM. Furthermore, in many cases, study participants were paid to take HIV tests and complete surveys or interviews, which may have introduced some degree of selection bias favoring those with greater financial need or individuals who are more motivated by financial rewards due to personality factors.

Table 2

*Socioeconomic Risk Factors, Behaviors, and Personality Traits*

Risk factors	Behaviors	Big Five personality traits
	Social status factors	
Youth	Increased risk of UAI (Murphy et al., 2009), exacerbated by age-related status differentials (Fields et al., 2012)	Less conscientious (Donnellan & Lucas, 2008; Lehmann et al., 2012; Soto, John, Gosling, & Potter, 2011)
African American Race	<p>Tendency toward low human capital (Murphy et al., 2009; Peterson &amp; Jones, 2009), poor health outcomes (Aday, 2001), and unrecognized HIV infection (Millet et al., 2007)</p> <p>Similar risk taking profile to White MSM (Friedman et al., 2009; Millet, Flores, Peterson, &amp; Bakeman, 2007), more consistent condom use in general (Murphy et al., 2009), but less likely to avoid UAI with partners who have unknown or different HIV status (Eaton et al., 2010)</p> <p>Negative associations with the medical establishment due to systemic discrimination (Friedman et al., 2009); less likely to access or trust medical services (German et al., 2011)</p>	<p>Seek tests due to health worries (Mimiaga et al., 2009); may indicate conscientiousness due to its association with heightened perception of health risks (Chauvin, Hermand, &amp; Mullet, 2007) or neuroticism, which is associated with a tendency to worry (Hampson &amp; Goldberg, 2006)</p> <p>Test avoidance due to perceived risk and fear of a positive result (MacKellar et al., 2011); may indicate an avoidant coping style, which is associated with neuroticism (Carver &amp; Connor-Smith, 2010)</p>
Male gender	Less likely to seek HIV testing (Johns et al., 2010)	Less conscientious (Schmitt et al., 2008) and therefore more inclined toward risky health behaviors (Bogg & Roberts, 2004; Shakelford, 2008; Terracciano et al., 2008)
	Human capital factors	
Low income, unemployment, and homelessness	<p>More high-risk sexual behaviors (Ayala et al., 2013; Elkington et al., 2010; Halkitis &amp; Figueroa, 2013) and higher HIV prevalence rates (Denning &amp; DiNenno, 2010)</p> <p>Reduced access to condoms (Rizkalla et al., 2010) and high-quality health services (Peterson &amp; Jones, 2009)</p> <p>Increased likelihood of engaging in survival sex or being financially dependent on high-risk partners (Mustanski et al., 2011)</p>	Lower scores for extraversion and openness (Jonassaint et al., 2011)
Low education	Reduced likelihood of health testing in general (Cutler & Lleras-Muney, 2010) and HIV testing in particular (Johns et al., 2010; Washington et al., 2013)	Lower scores for agreeableness, conscientiousness, and openness (Poropat, 2009)

Table 3

*Social Capital, Behavior, and Personality*

Social capital	Behaviors	Big Five personality traits
Social capital risk factors		
Lack of social support/fear of social judgment	Avoidance of condom use and HIV testing driven by fear of negative evaluation within African American communities (Brooks et al., 2005)  Lack of social support and concerns about social rejection due to homophobia associated with increased UAI (Ayala et al., 2012) and reduced willingness to take HIV tests (Khosropour, 2011)  Lack of access to social networks to obtain information about organizations offering free condoms (Mustanski et al., 2011)  Many young homosexuals rejected by their families (Mustanski et al., 2011).	Low conscientiousness associated with risky health behaviors (Bogg & Roberts, 2004)  Extraversion associated with sociability (Hampson & Goldberg, 2006), sexual risk taking (Schmitt & Shackelford, 2008; Zietsch et al., 2010), and direct coping style (Carver & Connor-Smith, 2010) that may encourage test seeking
Negative peer influences	Health behaviors (Umberson et al., 2010) and sexual risk taking (Peterson et al., 2009; Young & Rice, 2010) among young people significantly influenced by peers	Youth typically less conscientious (Donnellan & Lucas, 2008; Lehmann et al., 2012; Soto et al., 2011)
Positive social capital factors that mitigate risk		
Family support	Encourages academic engagement, which increases the likelihood that African American youth will evaluate risk-taking peers negatively (Kogan et al., 2011)	Established links between family environments and Big Five personality traits (Saucier, Wilson, & Warka, 2007)
Social support	Increases HIV testing rates (Mimiaga et al., 2009)	Extraversion may increase social support (Ironson, O' Cleirigh, Weiss, Schneiderman, & Costa Jr., 2009)
Religiosity (community ties)	Reduces the likelihood of sexual risk taking (Murphy et al., 2009)	Negatively correlated with neuroticism; positively correlated with agreeableness, conscientiousness, openness, and extraversion (Khoynezhad, Rajaei, & Sarvarazemy, 2012)

Another limitation of prior research in the field is that researchers have had to rely on self-report measures, which may lead to underreporting of high-risk behaviors when subjects provide what they believe to be socially desirable answers, particularly during face-to-face interviews. Phillips, Gomez, Boily, and Garnett (2010) gave evidence of this phenomenon, showing that among many subpopulations in various countries, respondents are less likely to report failure to use protection while having sex and having sex with a large number of partners during face-to-face interviews than via other methods such as self-administered computer surveys. This suggests that lack of privacy and anonymity may significantly influence the results of many studies on sexual risk-taking behavior and HIV testing. Phillips et al. (2010) also found differences in disclosure based on the education level of respondents, indicating that there are interactional SES-related effects on self-reporting of sexual risk behaviors (in other words, subjects' levels of education influence what they are inclined to disclose through various survey approaches).

An additional limitation of prior research is researchers' tendency to treat AAMSM as a homogenous group, even though this population is actually quite diverse. Individuals may identify as gay, bisexual, or another orientation; moreover, they may have experienced different environments depending on socioeconomic factors and the region of the U.S. in which they grew up. Younger and older cohorts of AAMSM will have grown up in different sociopolitical conditions, and geographically diverse AAMSM will have differing access to protection and HIV testing in the various regions where they currently reside. Therefore, the results of a study that examines condom use or testing rates in one U.S. city or state may not be generalized to other U.S. regions. A

number of large-scale meta-analyses were included in this literature review to provide more broad-based coverage of the variables of interest. However, these reviews highlight the fragmented and inconclusive nature of much of the research on risky sexual behaviors and HIV testing among young AAMSM.

Perhaps the most significant limitation from the perspective of the current study is that researchers have almost totally neglected the influence of personality on HIV testing in general, and have performed no research examining HIV testing rates among young AAMSM in relation to personality traits. This comprehensive review of the literature did not uncover a single study examining the influence of personality factors on the HIV testing rates of young AAMSM (or MSM of any age or race).

### **Key Concepts and Variables Related to Personality**

Prior research indicates that personality can influence HIV-related behaviors such as sexual risk taking (Schmitt & Shackelford, 2008; Zietsch et al., 2010) and the likelihood of seeking HIV testing (Hagger-Johnson & Shickle, 2010; Johnson, 2000). The following sections explore theories of personality with a focus on the Big Five model, followed by an examination of the model's predictive value for health behaviors in general and HIV testing in particular.

### **Theories of Personality: An Overview**

According to Westen, Gabbard, and Ortigo (1990), the evolution of personality theory began with Sigmund Freud's psychoanalytic theory, which represented an early attempt to develop a useful model of the mind. Freud's first theoretical framework divided the workings of the brain into the conscious, preconscious, and unconscious,

although he later refined the theory, recasting these three elements as the ego, the superego, and the id. Problematic thoughts and behaviors were thought to stem from repressed desires, and the framework was based on the premise that human motivation is not far removed from that of animals, with aggression and sexual drives playing a strong role in Freud's conceptual model.

Eventually, a wave of neo-Freudians that included highly influential theorists such as Alfred Adler and Carl Jung split from Freud. This modification of the original psychoanalytic model stemmed largely from the view that Freud placed too much emphasis on the influence of libido in personality formation and not enough on social forces (Westen et al., 1990). According to Boyle et al. (1995), psychoanalytic theories have been criticized and largely discounted due to their subjectivity and lack of scientific rigor. In addition, the authors noted that qualitative approaches in general fell out of favor during the 1920s, while quantitative approaches gained in popularity. Today, the most widely accepted personality theories fall within one of four broad categories: behavioral, cognitive, social learning, and trait theories. All of these are premised on the view that scientific methods provide a means by which personality can be understood (McCrae & Costa, 1996).

With the declining popularity of the psychoanalytic approach, the next wave of personality theorists emphasized cognitive-behavioral and social learning concepts rather than subconscious drives. Some attributed personality solely to socioenvironmental factors such as social conditioning and family dynamics, but more recent evidence indicates that many aspects of personality cannot be traced to environmental factors alone

(Boyle et al., 1995; Digman, 1990). The behaviorists were interested only in overt behaviors that could be observed and manipulated (Pribram, 1979). However, many others in the field of psychology were more interested in the internal thought processes that underpin actions, and they developed their theories accordingly. Among the more prominent of these was Bandura's social learning theory, which asserts that actions are shaped by expectancies about personal competence, consequences, and environments, as well as by incentives, which may be anything from the potential for improved health and physical appearance to the approval of others within a social group or economic rewards (Rosenstock, Strecher, & Becker, 1988). During this era of proliferation in personality theory, the Gestalt psychologists and existentialists also explored the inner workings of the mind with a focus on subjective experience rather than objectively measurable behaviors (Pribram, 1979).

In recent years, with advances in genetics, neurobiology, and related fields, there has been a resurgence of interest in predisposition theories of personality, which take the assumption that individuals are predisposed to certain traits and behaviors. Numerous studies have provided support for the contribution of genetics to personality (Digman, 1990; Heath, Cloninger, & Martin, 1994), and collectively, studies of genetic influences indicate that the heritability of personality traits is approximately 50% (Digman, 1990). New knowledge regarding the genetic contribution to personality led to the rise of trait theories over the years, which are based on the assumption that personality traits are relatively stable across situations (Boyle et al., 1995). This supposition was criticized by Mischel (1973), who asserted that traits are inferred based on behaviors in particular

situations, and although they may be useful for predicting behavior in similar future situations, they lose their predictive power in new and different situations. However, this critique was countered by Boyle et al. (1995), who pointed out that the situationist philosophy has been debunked by numerous other researchers. Issues surrounding the stability and predictive value of trait theories will be explored in greater depth in the sections that follow.

### **Trait Theories of Personality**

Trait theories of personality, which explore the potential for free will versus determinism, have amassed a significant amount of empirical support (McCrae & Costa, 1996). Many different trait theories of personality have been proposed; however, the theory developed by Hans Eysenck has been among the most influential (Petrides, Jackson, Furnham, & Levine, 2003). In work conducted in the 1940s, Eysenck originally divided personality into two dimensions, extraversion and neuroticism; he added psychoticism as a third dimension many years later (Digman, 1990). Eysenck's extraversion dimension is positively associated with talkativeness, outgoingness, and high energy; his neuroticism dimension with gloominess, nervousness, a tendency to worry, and feelings of vulnerability or helplessness; and his psychoticism dimension with adventurousness, excitement seeking, disinhibition, and impetuosity. Negatively correlated markers for extraversion in Eysenck's model are sluggishness, reserve, and a tendency toward apathy; those for neuroticism include cheerfulness, a relaxed demeanor, and autonomy; and those for psychoticism include a hesitant, careful, and subdued nature (Petrides et al., 2003). Although other research has provided support for Eysenck's first

two dimensions, psychoticism has been criticized as an inappropriate label that encompasses other trait descriptors that are more useful for the purposes of classification (Digman, 1990).

Eysenck was not the only theorist to create a trait-based taxonomy for the classification of personality attributes. Digman (1990) noted that a number of others developed their own systems, including Cattell, whose well-known taxonomy (established during the same era as Eysenck's work) was based on factor-analytic studies of postsecondary students. However, this system was extremely complex, employing not only 16 primary factors, but also 8 secondary factors. In the 1980s, Cloninger, another personality theorist, proposed three trait dimensions: harm avoidance, novelty seeking, and reward dependence (Heath et al., 1994). Descriptors used for measuring Cloninger's dimensions indicate that harm avoidance encompasses a trait continuum ranging from anxious, shy, and pessimistic to outgoing, daring and optimistic. Novelty seeking can be defined as the degree to which an individual tends toward impulsivity, extravagance, and irritability versus rigidity, thriftiness, stoicism, and reserve; and the reward-dependence continuum ranges from warm, sentimental, open, and attached to cool, aloof, and independent (Svrakic et al., 2002).

In his comprehensive overview of the Big Five model's evolution, Digman (1990) noted that numerous researchers and theorists have worked toward refining trait theories over the past six decades, with increasing convergence and subsequent reduction of trait descriptors. Most theorists and researchers have reached the consensus that personality can be classified based on approximately three to seven primary dimensions, with the Big

Five model being the most influential and widely accepted to date (Zillig, Hemenover, & Dienstbier, 2002).

### **The Big Five Model of Personality**

The Big Five model incorporates five trait dimensions: agreeableness, conscientiousness extraversion, neuroticism, and openness. Although theorists have proposed many other models over the years, the findings from various studies suggest that the Big Five traits are the most useful for describing personality (Digman, 1990). Today, the Big Five model is the prevailing trait theory (Zillig et al., 1990). Its primary strength is that it provides a means by which to integrate common elements among prior theories of personality, thus acting as a unified taxonomy and a framework for classification (John & Srivastava, 1999).

When contemplating the Big Five model of personality, it is helpful to define what researchers mean when they talk about traits. According to Zillig et al. (2002), trait theories once concentrated largely on behavior, but eventually evolved into an increased focus on the cognitive and affective domains. A habitual pattern of cognition, emotional response, and behavior can reflect a particular trait. In their research, the authors found that thought, feeling, and action are emphasized to differing degrees with each of the Big Five traits. Conscientiousness and extraversion tend to be more strongly associated with behavior, while the individual's thoughts and feelings more profoundly reflect neuroticism. The traits of openness and agreeableness tend to spark the most disagreement regarding the degree to which behavior, cognition, or emotional tendencies reflect them. Overall, the findings reported by Zillig et al. (2002) indicate that when

measuring some of the Big Five personality traits, researchers look more to overt, observable behaviors, whereas for others, they find measures of cognition and affective response to be more informative.

Today, researchers use a number of instruments to measure the Big Five personality traits. Tests of reliability across commonly used instruments indicate that the measures of neuroticism, extraversion, and conscientiousness are particularly reliable, whereas those of agreeableness and openness show less robust reliability (John & Srivastava, 1999). These variations in reliability may be attributable to the wider range of measures used for the latter two traits (Zillig et al., 2002), and to the use of younger populations at liberal colleges in some case, which tend to score more highly on openness (John & Srivastava, 1999). As for the validity of Big Five model measurements, John and Srivastava (1999) noted that “the Big Five are fairly independent dimensions that can be measured with convergent and discriminant validity” (p. 26). Studies of the Big Five model conducted in numerous countries indicate that this trait theory is valid across cultures (Digman, 1990). The results of a 50-culture study support this supposition; here, McCrae and Terracciano (2005) showed that the Big Five personality traits are relevant to all cultures.

Animal studies have provided more evidence for the universality of the Big Five. According to John and Srivastava (1999), the dimensions of extraversion, neuroticism, agreeableness, and openness exist in a broad array of nonhuman animals. The authors noted that conscientiousness is the one trait within the model that appears relevant only to humans and chimpanzees, likely due to the social and cognitive complexity of the

behavior and thought markers associated with this personality dimension. The presence of the Big Five traits in nonhuman animals suggest that these personality dimensions are at least partially attributable to genetic rather than social factors, given that nonhuman animals are raised in very different social environments to those of human children.

Overall, a review of the literature indicates that there is strong support for the Big Five model as an empirical system for the classification of personality traits. By contrast, empirical support for other trait theories is weaker. Helmes (1980) found little support for Eysenck's personality trait questionnaire, which incorporates four domains, specifically extraversion, neuroticism, psychoticism, and lying (the tendency to give socially desirable rather than honest answers). However, despite a consensus regarding the existence of the Big Five traits, and although a number of commonly used markers exist, there is some disagreement among theorists and researchers concerning the precise definitions, parameters, and overall scope of each dimension (Zillig et al., 2002).

Hampson and Goldberg (2006) compiled a comprehensive list of positive and negative Big Five markers used in prior research to create an extensive questionnaire for their own research on the stability of Big Five traits over time. The results of this questionnaire indicated a unique profile for each of the five traits. The researchers found that those who score highly on the agreeableness dimension are considerate and cooperative, sympathetic and kind, unselfish and forgiving, polite, warm, and inclined toward happiness. Those receiving low scores for this trait are inclined toward aloofness, coldness, rudeness, and a lack of sympathy for others. Conscientious individuals make plans and follow through with them. They are organized, persevering, practical, reliable,

sensible, efficient, systematic, thorough, carefully energetic, and neat. In contrast, those lacking in conscientiousness are disorganized, easily distracted, lazy, sloppy, irresponsible, inefficient, and careless. Extraverts are assertive, bold, gregarious, outspoken, socially confident, and talkative, and they tend to generate a lot of enthusiasm during their interactions with others. On the other end of the spectrum, introverts tend to be shy, reclusive, reserved, quiet, and inhibited.

Neuroticism can be defined as the inverse of emotional stability. Neurotic individuals manifest a plethora of negative traits, including moodiness, rigidity, self-centeredness, a tendency toward envy and depression, impulsiveness, and fickleness. Moreover, they tend to be temperamental, nervous, restless, impulsive, fidgety, fretful, and quarrelsome. They worry excessively and approach life from a suspicious and fearful perspective. They also tend to be very concerned about acceptance by others but also quick to find fault with them. The flipside of neuroticism is a relaxed, adaptable temperament. Emotionally stable individuals handle stress well, are not easily upset or prone to envy, and tend to remain calm in tense situations.

Openness, the fifth personality dimension, has close ties to the intellect. People who score highly for this overarching trait are creative, curious, deep, imaginative, inventive, self-reliant, original, perceptive, complex, intellectual, verbally fluent, and philosophical. They generally value and are sensitive to aesthetic experiences such as art and music. Those scoring low for this trait tend to lack creativity and artistic and intellectual interests, and will typically prefer routine work.

The Big Five model provides a theoretical foundation for personality research, but does not constitute a comprehensive personality theory (John & Srivastava, 1999). Furthermore, some researchers have challenged aspects of the Big Five model based on issues such as the possible instability of personality over time (Digman, 1990) and the influence of situational factors on behavior (Mischel, 1973). Some investigators have found minor differences in Big Five personality dimension scores across the lifespan (Donnellan & Lucas, 2008; Hampson & Goldberg, 2006; McCrae & Terracciano, 2005), although others have found no variation in these traits over time (Digman, 1990).

In their longitudinal study, Hampson and Goldberg (2006) found slight differences in the stability of individual Big Five traits. The researchers noted that extraversion and conscientiousness are more stable over time than openness, agreeableness, and neuroticism. McCrae and Terracciano's (2005) international research indicated that trait scores may change moderately during the college years and slightly past the age of 40, and that gender differences in average trait scores tend to be more pronounced in Western cultures, which suggests some socioenvironmental influence. In a large-scale study that incorporated datasets from Britain and Germany, Donnellan and Lucas (2008) found that openness and extraversion tend to decrease with age, while agreeableness increases and conscientiousness peaks during middle age. Neuroticism appears to rise with age in Germany but decrease with age in the UK, which provides more evidence for socioenvironmental influences. In this study, the researchers did not find that education levels or gender affect age-related changes in Big Five dimension scores. However, the authors noted some limitations of their research, including possible

cohort effects and that, given that they belonged to a select subgroup of individuals who had outlived their peers, older members of the sample may not have represented their age group. It is possible that certain personality traits, such as, cautiousness or a tendency to be relaxed and cheerful predispose certain individuals to longevity.

Additional studies that have shown variations in gender differences from one nation to the next support a minor role of socioenvironmental factors when it comes to shaping Big Five personality traits. Schmitt et al. (2008) examined cross-cultural gender differences in Big Five personality dimension scores and found larger gender differences in developed, affluent nations. The authors attributed the divergence in certain nations largely to changes in male personality traits, and speculated that constraints imposed by dire economic conditions may reduce a natural sexual dimorphism in personality. However, in keeping with the findings of prior researchers, Schmitt et al. (2008) found that women tend to be more conscientious, extraverted, neurotic, and agreeable than men across nations.

Another criticism of the Big Five model is that many of the terms used to describe traits suggest multiple meanings. Agreeableness could potentially be associated with submissiveness, but under the Big Five model, submissiveness aligns more closely with the extraversion domain as a marker of introversion (John & Srivastava, 1999). An additional criticism is that the Big Five model is too narrow, containing too few trait categories to truly capture all facets of personality (John & Srivastava, 1999). In other words, the model provides breadth but not depth of classification. Despite some minor limitations, a review of the literature indicates that the majority of researchers and experts

in the field favor the Big Five model as the best means by which to describe personality quantitatively, thereby facilitating comparisons and practical applications.

While data derived from interviews and common psychiatric diagnostic methods tend to be unreliable, statistics typically have robust predictive power, indicating that clinical practice could benefit significantly from a quantitative approach (Boyle et al., 1995). The potential for quantifying personality factors is therefore a particularly appealing aspect of the Big Five model. However, there is evidence that this system goes beyond simply quantifying traits. Numerous studies have shown that it also has predictive value for a wide variety of behaviors (Cuperman & Ickes, 2009; John & Srivastava, 1999), suggesting its potential for use in clinical and occupational applications.

### **Predictive Ability of the Big Five Model**

A review of the literature indicates that there is a great deal of empirical support for the predictive ability of the Big Five model. Fleeson and Gallagher's (2009) meta-analysis of 15 studies showed that Big Five traits strongly predict behavior in a variety of life situations. Many researchers have explored the predictive power of the Big Five for a variety of specific traits, tendencies, and outcomes. The following discussion presents a selection of research findings that shows the scope of the model's predictive ability.

The influence of the Big Five traits on life outcomes begins early. Poropat's (2009) meta-analysis of Big Five traits and academic performance, which encompassed a cumulative sample of more than 70,000 subjects, indicated that academic achievement correlates with agreeableness, conscientiousness, and openness. As for negative outcomes

among young people, John and Srivavasta (1999) reported that low conscientiousness and agreeableness scores predict juvenile delinquency.

The Big Five traits continue to assert their influence in adulthood. Barrick and Mount (1991), who conducted a meta-analysis of 17 studies encompassing professionals, skilled and semi-skilled workers, managers, salespeople, and police officers, found that conscientiousness is consistently associated with meeting all job performance criteria. Extraversion, in particular, predicts performance in sales and managerial positions, although other Big Five dimensions have small but significant effects for particular occupations. In a study of career success and longevity spanning 65 years, Kern et al. (2009) found that childhood conscientiousness scores predict both success and longevity.

The Big Five traits also have predictive value for social tendencies. In their study of social interaction, Cuperman and Ickes (2009) found that dyads comprising two extraverts or two introverts are inclined to report positive social interactions compared to dyads composed of dissimilar pairs. The authors also noted the unsurprising finding that members of dyads with low agreeableness scores tend to have less pleasant experiences with one another.

In their comprehensive literature review of leadership styles, Judge et al. (2009) made a number of observations with regard to Big Five traits. First, agreeable leaders tend to be empathic, friendly, cooperative, gentle, pleasant, and fair. Second, conscientious leaders tend to be fair, just, tenacious, persistent, performance-oriented, and ethical. Third, extraversion is consistently associated with the emergence of leadership and transformational leadership behavior. Fourth, emotional stability (an

inverse marker for neuroticism) reduces turnover intentions and increases job satisfaction among subordinates, and emotionally stable leaders are more likely to remain calm during crises and recover more quickly from failures. Fifth, leaders with high openness scores are more inclined to inspire, motivate, and cope well with organizational change.

There is evidence that Big Five traits also affect health both directly and indirectly by influencing health-related behaviors. Miller, Cohen, Rabin, Skoner, and Doyle (1999) found that agreeableness and extraversion are associated with lower blood pressure, indicating that these traits may have a protective function. Lahey's (2009) comprehensive literature review on the connection between neuroticism and health indicated that neuroticism correlates with a higher risk for illness and death and reduced quality of life overall. As for health behaviors, in a study of managers and professionals in various business sectors, Nicholson et al. (2002) found that risk takers (including those willing to risk their health) tend to receive higher-than-average scores for extroversion and openness, and lower scores for agreeableness, conscientiousness, and neuroticism. Of particular interest to the current research, in a study of sexual behavior and Big Five traits encompassing 46 nations, Schmitt and Shackelford (2008) found that low agreeableness, low conscientiousness, and high extraversion scores are associated with risky sexual behaviors such as short-term mating.

Researchers may have underestimated the predictive value of the Big Five model, given that the widespread practice of using short measures of the five personality domains significantly increases the rates of Type 1 and 2 errors (Credé, Harms,

Niehorster, & Gaye-Valentine, 2008). An overview of the instruments commonly used to generate Big Five scores is provided in the following section.

### **Instruments Used to Measure the Big Five**

Various researchers have developed a number of instruments over the years to measure the five factors of personality. Table 4 gives an overview of frequently used Big Five questionnaires.

Table 4

#### *Big Five Personality Measures*

Instrument	Creator	Description
Big Five Aspect Scales (BFAS)	Colin G. DeYoung	This 100-item questionnaire splits each of the five factors into two aspects, with 10 questions for each (DeYoung, Quilty, & Peterson, 2007).
Big Five Inventory (BFI)	Oliver P. John	The BFI is a brief self-report instrument comprising 44 items. Items are in the form of short phrases (John, 2009).
International Personality Item Pool (IPIP)	Lew Goldberg	Goldberg modeled the short and long versions of the IPIP on Costa and McCrae's NEO (see below). However, the IPIP instrument is in the public domain, whereas both versions of the NEO are only available commercially (Srivavasta, 2013).
NEO-PI-R and NEO-FFI <sup>a</sup>	Paul T. Costa and Robert R. McCrae	The NEO-Personality Inventory-Revised (PI-R) comprises 240 items designed to measure the Big Five traits plus facets of each of these dimensions. The NEO-Five Factor Inventory (FFI) is a shorter version, with 60 items used to measure only the five factors (Srivavasta, 2013).
Ten-Item Personality Inventory (TIPI)	Sam Gosling, Jason Rentfrow, and Bill Swann	Gosling, Rentfrow, and Swann designed the TIPI, which contains just 10 items, for use in situations where researchers consider it necessary to trade psychometric power for expediency. This short Big Five measurement instrument has adequate convergence with self and observer ratings and test-retest reliability, although its psychometric power is not as strong as that of longer measures (Gosling, Rentfrow, & Swann, 2003).

<sup>a</sup> This instrument was initially called the Neuroticism-Extroversion-Openness Inventory, hence the acronym. However, since its expansion to encompass all five factors of the Big Five model, only the acronym has been used.

A review of the literature indicates that researchers most commonly use the measures specified above, and instruments conforming to the Big Five model are the preferred measures of personality in general. However, in some cases, investigators have developed personality measurement instruments to support individual studies, with insufficient attention paid to reliability and validity (Smith, 2006).

Evidence suggests that researchers often favor instruments measuring Big Five factors over those associated with other personality models. Saucier and Goldberg (2002) described a factor as “a parsimonious reduction of many observed variables into one hypothetical variable” (p. 30). A review of the literature indicates that the five-factor model, in various similar forms, is the most widely used model of personality; researchers have proven its cross-observer validity for all five factors (McCrae & Costa, 1987). Furthermore, it is the most parsimonious, as researchers have reduced similar trait markers appearing in various studies over the years to the five factors encapsulated in the Big Five model (Digman, 1990).

DeYoung et al. (2010) brain imaging research has provided even more support for the model; these researchers showed that four of the five factors covary with brain regions whose functions are relevant to each dimension. Conscientiousness is associated with the volume of the lateral prefrontal cortex, an area of the brain that participates in voluntary behavioral control and planning. Agreeableness varies in conjunction with information processing areas of the brain that focus on identifying the mental states and intentions of other people. Medial orbitofrontal cortex volume links to extraversion, which means that this trait is associated with a brain region involved in the processing of

reward information. Moreover, the neuroticism dimension covaries with areas of the brain linked to punishment, negative emotional responses, and threats. Additional physiological supporting evidence for the Big Five model comes from Miller et al.'s (1999) findings, which indicated that agreeableness inversely correlates with blood pressure and epinephrine levels, and that extraversion has a negative relationship with blood pressure, norepinephrine and epinephrine levels, and natural killer cell cytotoxicity.

There is significant empirical support for the Big Five model, and a review of the literature indicates that it has been widely accepted by researchers and experts. Furthermore, evidence has been mounting concerning the relevance of the five-factor model to health-related behaviors and outcomes (Bogg & Roberts, 2004; Kern et al., 2009; Lahey, 2009; Young & Beaujean, 2011). Given the myriad strengths of the Big Five model and its applicability to the health field, it is the ideal model of personality for the present research. It was incorporated into the conceptual framework of this study as detailed in the following section.

### **Association Between Personality and Risky Health-Related Behaviors**

Evidence suggests that personality affects health, and does so by several possible mechanisms. Personality may reflect an underlying pathogenesis; personality traits may encourage or discourage various health-related behaviors; or personality differences may simply manifest as a function of individual responses to physical or psychological illnesses (for example, coping strategies or adherence to treatment; Caspi & Roberts, 2001, as cited in Young & Beaujean, 2011). Regardless of the mechanism or mechanisms through which personality exerts its effects on health, there is mounting evidence that

each of the Big Five traits has a profound influence on health-related behaviors and attitudes, and by extension, health outcomes. The following is an overview of research linking each of the five personality dimensions to various health-related behaviors and attitudes. Research focused specifically on HIV-related health behaviors will be covered in greater depth in the Key Variables and Concepts section of this chapter.

### **Agreeableness**

Risk taking in general is associated with lower-than-average agreeableness scores (Nicholson et al., 2002), and a number of researchers have studied the influence of agreeableness on behaviors that could negatively affect health and safety. Chauvin et al. (2007) found that agreeableness correlates positively with an individual's perception of the dangers associated with drug abuse and risky sexual behaviors. In other words, agreeable people are more concerned about the risks of certain health-related behaviors and are therefore less likely to engage in them. This is in keeping with Terracciano and Costa's (2004) findings, which indicated that those who smoke tend to be less agreeable on average. The authors suggest that disagreeable individuals are less likely to care about the negative impacts of smoking on other people and are less susceptible to social pressure from others who urge them to quit. The research of Malouff, Thorsteinsson, and Schutte (2006) also supports this, as the researchers found a negative correlation between smoking and agreeableness.

In a study of very young girls (average age of 10.72 years), Markey, Markey, and Tinsley (2003) found that those with low agreeableness scores were more likely to have engaged in risky behaviors such as smoking, alcohol consumption, and kissing boys

(which was conceptualized by the researchers as a gateway to early sexual activity). Moreover, Terracciano et al. (2008) found that marijuana users tend to receive lower agreeableness scores, and Machin and Sankey (2008) reported that altruism, which is a marker for agreeableness, correlates negatively with both speeding and the likelihood of having an accident among young drivers. In a multinational study, Schmitt and Shackelford (2008) identified a correlation between low agreeableness scores and risky sexual behavior (short-term sexual relationships). Vollrath, Knoch, and Cassano (1999) also found that high scores for agreeableness reduce the likelihood of engaging in risky sexual activities, smoking, drinking, and drunk driving. In addition, Sutin, Ferrucci, Zonderman, and Terracciano (2011), who conducted a longitudinal study spanning more than 50 years, identified an inverse correlation between agreeableness and weight gain over the lifespan, particularly among individuals who scored highly for impulsiveness.

There is substantial evidence to suggest that agreeableness is a significant predictor for a broad array of health behaviors, and that this dimension may influence preferences with regard to accessing health services. Klein and Cook (2010), who examined attitudes toward using online medical services, found that those with higher agreeableness scores were less inclined to prefer e-medical services to in-person services. A review of the literature also indicates several possible mechanisms on how agreeableness influence health behavior, including heightened risk perception (Chauvin et al., 2007), reduced susceptibility to social pressure (Terracciano and Costa, 2004), and low altruism (Machin and Sankey, 2008). However, as illustrated in the sections that

follow, other Big Five traits appear to have a stronger influence on the likelihood of engaging in risky health behaviors.

### **Conscientiousness**

Bogg and Roberts (2004) conducted a meta-analysis of 194 studies and found that conscientiousness correlates positively with all health-promoting behaviors and negatively with all behaviors that put health at risk. Health-related behaviors included in this study were as follows:

- Activity: frequency and quantity of physical exercise, overall fitness level.
- Alcohol use: heavy drinking.
- Drug use: marijuana, opiates/heroin, polysubstance.
- Unhealthy eating: bad food choices, obesity.
- Risky driving: drunk driving or riding with drunk drivers, speeding, hazardous driving, history of accidents.
- Risky sex: number of partners, unprotected sex, risky acts, risky partners.
- Suicide: attempts, completed suicides, suicidal ideation, suicidal risk factors.
- Tobacco use: smoking tobacco, frequency of consumption, quantity consumed.
- Violence: aggressive/delinquent acts, convictions, incarcerations, interpersonal aggression, sexual aggression.

The specific variables related to conscientiousness with the most profound effects on health-related behaviors were self-control, responsibility, and traditionalism (Bogg & Roberts, 2004). The findings of this research are in keeping with those of Nicholson et al.

(2002), which indicated an inverse correlation between conscientiousness and risk taking in general.

Other researchers have associated conscientiousness with longevity (Kern & Friedman, 2008; Smith, 2006) and longer survival among those who suffer from serious illnesses (Smith, 2006). Furthermore, conscientiousness in childhood correlates with a reduced likelihood of smoking and better overall self-rated health in adulthood (Hampson, Goldberg, Vogt, & Dubanoski, 2006). Conscientiousness also increases the perception of risk associated with dangerous sexual activities and drug abuse, and this heightened risk perception likely encourages a more cautious approach to life overall (Chauvin et al., 2007).

More evidence for the role of conscientiousness in overall health comes from a study by Takahashi et al. (2012), who found that health-protective behaviors (illness prevention, wellness maintenance, and accident control) and overall health vary along with conscientiousness over the lifespan. There is also evidence that conscientiousness affects behaviors among those who are ill in such a way as to improve their health prospects. In their study, Ironson et al. (2009) found that higher conscientiousness scores are associated with a slower progression of HIV disease.

Many researchers have examined the effect of conscientiousness on particular health-related behaviors. Terracciano et al. (2009) and Sutin et al. (2011) found that conscientiousness correlates inversely with being overweight. Furthermore, Terracciano and Costa (2004) and Malouff et al. (2006) indicated that smokers tend to have lower scores for conscientiousness, and Schmitt and Shackelford (2008) determined that less

conscientious individuals are more likely to engage in risky sexual behaviors such as short-term mating. In line with these findings, Vollrath et al. (1999) claimed that high scores for conscientiousness reduce the perception of susceptibility to health risks both directly and through the reduction of dangerous behaviors such as risky sexual activities, smoking, and drinking. Markey et al. (2003) also found that low conscientiousness scores predict risky behaviors such as smoking, drinking, and kissing boys (considered a gateway to sexual activity) among 5th-grade girls. In addition, Terracciano et al.'s (2008) findings in their study on drug use indicated that marijuana users are less conscientious than the average person and that heroin and cocaine users receive particularly low scores for this dimension.

Hampson (2008) suggested a number of mechanisms of how conscientiousness influences health. First, individuals that are more conscientious may be more responsive to social behavioral controls and better able to control their own impulses to engage in riskier or otherwise unhealthy behaviors. Second, conscientious individuals may be more inclined to seek out work and leisure environments that tend to be safe, and to associate with more responsible, conscientious companions. Third, conscientious people are more likely to behave in a manner that attracts praise and other positive responses from others, which likely reinforces their conscientious attitudes and behaviors over time and thus increases their effects.

The influence of conscientiousness may go beyond simply encouraging healthier behaviors and risk avoidance. Hampson (2008), referring to the Terman Lifecycle study's finding that conscientious children are nearly one-third less likely to die in any given year

than their less conscientious counterparts, noted that this trait's influence on longevity cannot solely be attributed to health behaviors. The author suggested that because conscientiousness is correlated with higher educational attainment, and educational level is correlated with midlife health status, a predisposition toward academic achievement may also be a key mechanism.

Despite an abundance of research supporting the positive role of conscientiousness in the maintenance of health and safety, not all researchers have found a relationship between this trait and health-protective behaviors. In their study of glucose control among adult diabetics, Lane et al. (2000), found no correlation between conscientiousness and better control of blood sugar among participants.

According to Bogg and Roberts (2004), it may be difficult to determine the contribution of conscientiousness to overall health, given that it tends to be associated with a number of socioenvironmental factors including high SES, marital stability, and religiosity that are conducive to good health. The authors also noted that effects may be bidirectional. Conscientiousness reduces the risk that an individual will abuse drugs, but quitting drugs may also make an individual more conscientious. Overall, a review of the evidence suggests that conscientiousness is the most significant Big Five predictor of health-related behaviors and attitudes.

### **Extraversion**

Extraversion is generally associated with a propensity toward risk taking (Nicholson et al., 2002). However, studies of its influence on health outcomes have yielded mixed results (Ironson et al., 2009). Chauvin et al. (2007) found a relationship

between some markers of extraversion and reduced perception of risk associated with sexual and drug-related behaviors. Researchers have found an association between certain facets of extraversion such as impulsivity and excitement seeking have also been associated with smoking, although the extraversion dimension as a whole has not (Terracciano & Costa, 2004). Interestingly, Malouf et al. (2006), who conducted a multinational meta-analysis to explore the relationship between each of the Big Five factors and smoking, found that extraversion correlates with smoking in Spain and Japan, but not in Canada and the United States, suggesting mitigating cultural effects for this trait. Moreover, Machin and Sankey (2008) observed an expected association between excitement seeking (a facet of extraversion) and speeding.

As for behaviors that increase individuals' risk for HIV infection, Schmitt and Shackelford (2008) found that extraversion correlates positively with risky sexual behaviors such as short-term mating and unrestricted sexuality. Zietsch et al. (2010) also found a correlation between extraversion and risky sexual behaviors, which the authors defined as having unprotected sex, failure to use birth control, engaging in sex with many partners, not being discriminating in sex partner selection, engaging in multiple sexual partnerships simultaneously, and having sex while drunk. These researchers used Eysenck's model; however, two of the domains they incorporated into their research, extraversion and neuroticism, overlap with the Big Five model. The results of the Zietsch et al.'s (2010) study are in keeping with those of Vollrath et al. (1999), who showed that extraversion correlates with heavy drinking and risky sexual behavior.

There is some evidence that extraversion is not a liability for all aspects of health. Ironson et al. (2009) found that extraversion is associated with a slower progression of HIV disease, where dimensions such as assertiveness, gregariousness, and positive emotions had the strongest protective effects. The researchers explained this result in that extraverts are more inclined to reach out to others and maintain supportive social networks, behaviors that are associated with more positive health outcomes.

Schaller and Murray (2008) provided evidence to suggest that extraversion has bidirectional effects, as those living in regions with historically high infectious disease prevalence rates tend to score lower on measures of extraversion. The authors raised some possible mechanisms to account for this finding, such as the process of natural selection favoring genes that are more likely to aid in survival within a particular environment or differing expression of genes within the overall genotype in response to environmental pressures. It is unsurprising that a sociable personality could be a health liability in a highly infectious environment, so the argument that extraversion is selected against in certain regions has merit.

The evidence suggests that the excitement-seeking facet of extraversion may lead to engaging in risky health behaviors, while the sociability facet that may be beneficial in maintaining health; this would account for the conflicting findings regarding this trait's influence on overall health. In addition, extraversion is likely to affect the ways in which individuals access medical services. Unsurprisingly, Klein and Cook (2010) found that those who receive higher extraversion scores are less inclined to prefer receiving medical services online to in-person services. Researchers have also linked extraversion with

coping behaviors, in that extraverts tend to prefer engagement coping, which means that they are more likely to face problems directly than to avoid them (Carver & Connor-Smith, 2010).

### **Neuroticism**

In his comprehensive review of the literature, Lahey (2009) indicated that neuroticism is associated with a broad array of mental and physical health disorders, more frequent use of health services, greater overall risk for morbidity and mortality, and reduced quality of life. Many researchers have examined the effects of neuroticism in relation to particular health issues. In their study, Griffith et al. (2010) found a relationship between neuroticism and disorders of anxiety and mood, which tend to influence health behaviors. In addition, Terracciano et al. (2009) found that neurotic individuals are more inclined to be underweight, while Sutin et al. (2011) reported that neuroticism correlates with higher body weight (both attributes reflect risky eating habits and are associated with poor health outcomes).

Although numerous researchers have linked neuroticism to increased risk for health problems, Smith (2006) noted that such studies might have overestimated this correlation due to the inclusion of somatic complaints along with objectively identified diseases. In other words, neurotic individuals may be more prone to hypochondriasis or somatic complaints triggered by stress, and may, therefore provide self-reports indicating poor health even in the absence of disease diagnosed by a health professional. Smith also found evidence that the neuroticism dimension may be less stable than the other ones, particularly in stressful situations. Fogle (2012) demonstrated that while agreeableness,

conscientiousness, extraversion, and openness do not vary in response to perceived stress, emotional stability (an inverse marker for neuroticism) does. The researcher also noted that perceived stress is associated with personal health care habits among university students: Those reporting greater stress are less inclined to engage in healthful habits. This suggests bidirectional effects of neuroticism and health habits, and indicates that stress is a potent confounding variable that moderates the personality's influence on health-related behaviors.

Neurotic individuals are more inclined to be risk averse in general (Nicholson et al., 2002). However, Malouf et al. (2006) gave evidence to the effect that neuroticism can underpin certain risky health behaviors. Moreover, Terracciano and Costa (2004) reported that higher neuroticism scores are associated with smoking, particularly among less conscientious individuals. These authors suggested that neurotic individuals might self-medicate for mood disorders or other psychopathology with nicotine. Terracciano et al. (2008) showed that individuals who use cigarettes, heroin, and cocaine tend to have higher-than-average neuroticism scores; this is particularly true for those who abuse hard drugs.

Interestingly, Lane et al. (2000) actually found a positive relationship between higher neuroticism scores and better control of blood sugar among diabetics, suggesting better self-care among neurotics. However, the sample for this study comprised just 105 individuals and Caucasians were overrepresented. Also noteworthy is Jonason and Perilloux's (2012) findings that neurotic individuals tend to be more vigilant to evolutionarily relevant threats (physical, social, and mating). It may be that increased

concern about threats, particularly physical threats that could endanger health cause some neurotic individuals to be more conscientious in caring for their health and averse to engaging in risky health behaviors. Vollrath et al.'s (1999) findings support this claim, indicating that although neuroticism appears to neither increase nor decrease the likelihood of engaging in risky behaviors such as smoking, drinking, drunk driving, and risky sexual acts, neurotic individuals perceive a heightened susceptibility to health risks such as alcoholism, accidents, and the possibility of acquiring HIV or other sexually transmitted diseases. On the other hand, Zietsch et al. (2010) reported that neuroticism scores correlate positively with risky sexual behaviors, so the connection is far from clear at this point and more research is required.

The review of the literature indicates that neuroticism affects health behavior via a number of mechanisms. On one hand, neurotic individuals tend to be more threat sensitive (Jonason & Perilloux, 2012; Vollrath et al., 1999) and risk averse (Nicholson et al., 2002). On the other hand, stress and anxiety may lead them to engage in certain risky health behaviors, while conscientiousness appears to mitigate the effects of neuroticism on health behaviors (Terracciano & Costa, 2004). Given its association with avoidant coping strategies, neuroticism may also influence health-testing behavior (Carver & Connor-Smith, 2010).

### **Openness**

According to Ironson et al. (2009), since they are intellectually curious, open individuals may be more proactive in seeking health-related information. The authors also noted that prior research has shown a relationship between openness and more

realistic estimates of HIV risk. However, Vollrath et al. (1999) found that those who score higher on openness are more inclined to engage in risky sexual behaviors and less likely to consider themselves susceptible to driving accidents. This is in keeping with Nicholson et al.'s (2002) finding that those who score highly for openness are more inclined to take risks. Furthermore, Markey et al. (2003) showed that among 5<sup>th</sup>-grade girls who experience early puberty, those who score highly on the openness-to-experience dimension are more inclined to engage in behaviors that could potentially compromise their health. Terracciano et al. (2008) also found a positive correlation between openness and marijuana use.

Schaller and Murray (2008) reported lower average openness scores in regions with high infectious disease rates in the past. The researchers considered that this might be attributable to natural selection or gene expression that facilitates survival in particular environments by favoring the traits more likely to promote it. Openness to new experiences may not be an ideal trait for a highly infectious environment. Furthermore, Klein and Cook (2010) found a negative correlation between openness to experience and a preference for using online medical services over in-person services, indicating that openness may affect the ways in which individuals interact with medical services.

This review of the literature indicates that researchers know little about the mechanisms by which openness influences health behavior, although they have speculated a fair amount on this topic. Openness does appear to predispose individuals to risk taking in general (Nicholson et al., 2002) and dangerous health behaviors in particular (Markey et al., 1993; Terracciano et al., 2008; Vollrath et al., 1999). However,

there are mitigating influences on health behaviors such as age and SES; these will be addressed in the sections that follow.

### **Direct Effects of Social Risk Factors on Personality and Risky Health Behaviors**

A review of prior research indicates that social status factors, human capital, and social capital influence both personality and health-related behaviors. The following sections explore these issues, with a particular focus on variations in Big Five traits during adolescence and the influence of social risk factors on the likelihood of engaging in risky health behaviors and seeking HIV testing.

### **Age, Health Behavior, and HIV Testing**

Researchers have found a significant amount of evidence linking the Big Five traits with neural correlates (DeYoung et al., 2010). Therefore, if the adolescent brain is different from the adult brain, then one would expect this to manifest as variations in Big Five dimension scores and accompanying behaviors; research into adolescent development conducted thus far suggests that this is the case. Doremus-Fitzwater, Varlinskaya, and Spear (2010) undertook a comprehensive review indicating that hormonal, physiological, and neural aspects of adolescence have profound effects on the behavioral proclivities of young people. Teenagers favor peer-directed social interactions, are inclined to seek novelty and risk, and are more likely to abuse alcohol and other substances than their adult counterparts are. Doremus-Fitzwater, Varlinskaya, and Spear asserted that these tendencies are likely attributable to differences in areas of the adolescent brain that are involved in motivation and reward. The authors note that adolescents are more sensitive to rewards than adults are (for example, the enjoyment of

intoxication), as well as less sensitive to punishments (such as the nausea associated with alcohol poisoning).

Knowledge of the differences between adolescent and adult brains provides some insight into the ways in which age may influence personality. For example, one would expect that individuals who perceive greater rewards and smaller penalties for risk taking would score lower for conscientiousness, a trait associated with caution and risk aversion (Nicholson et al., 2002); longitudinal studies of Big Five traits have shown that conscientiousness is indeed inversely correlated with age (Donnellan & Lucas, 2008; Lehmann et al., 2012; Soto et al., 2011).

A significant amount of research links extraversion to risky sexual behavior (Schmitt & Shackelford, 2008; Zietsch et al., 2010). However, when it comes to risky health behaviors and health testing, the relationship between the tendency toward social interaction and risk among youth may be more complex.

HIV testing rates among adolescents remain low. In their study, Swenson, Hadley, Houck, Dance, and Brown (2010) found that just over half (52.1%) of adolescents offered a free HIV test were willing to take it. Straub et al. (2011) noted a higher rate of testing among high-risk adolescents, with 72% of 1,257 participants spanning 15 U.S. cities reporting prior HIV testing. However, this study used 24 years of age as a cutoff, whereas Swenson et al. (2010) included only those under 21 years, and this may have affected the results. Interestingly, Straub et al. (2011) found that MSM, females who have sex with MSM, individuals who do not use condoms consistently, and those reporting more than three sexual partners in as many months are more likely to

state that they have undergone testing. These findings indicate that high-risk behavior is associated with a greater likelihood of testing among adolescents. This is an important finding, because it suggests that young people are aware of the risks associated with their actions, but such risks do not deter them.

### **The Big Five Traits in Young Adults**

Many researchers have identified minor age-related differences in Big Five personality dimension scores (Donnellan & Lucas, 2008; Hampson & Goldberg, 2006; Lehmann et al., 2012; McCrae & Terracciano, 2005; Soto et al., 2011; Specht, Egloff, & Schmukle, 2011; Vecchione et al., 2012; Wortman et al., 2012). Soto et al. (2011) conducted a particularly noteworthy longitudinal study. This research, whose participants spanned in age from 10 to 65 years, showed that agreeableness dips to its lowest point in early adolescence, rises sharply back to childhood levels and beyond in late adolescence, and then rises steadily but less sharply throughout the adult years, with a slowdown after middle age. Conscientiousness, a key factor in health behaviors, follows the same trajectory, but with an even more pronounced dip in early adolescence and rise thereafter. Extraversion scores tend to be high in childhood, plummet toward mid-adolescence, and then hold steady throughout the adult years. Neuroticism shows very different trajectories in males and females. In males, this trait declines steadily in childhood and adolescence, rises slightly in early middle age, and declines slightly thereafter. For women, this trait spikes in early to mid-adolescence, holds relatively steady throughout the 20s, and then declines steadily after age 30. Slight gender differences are apparent for the trait of openness as well. Females begin with relatively high scores for this dimension at age 10;

their scores drop steadily until around age 20, and then they rise gradually throughout the adult years, although they reach a relative plateau from their mid-20s to around age 40. Male scores also begin at a high point, plummet during early adolescence, rise until the mid-20s, flatten out until the mid-40s, and then begin to rise gradually again. Male and female scores on this dimension begin and end at approximately the same place. A particular strength of Soto et al.'s (2011) study is that the researchers collected data over 7 years, so that although the design was cross-sectional, multiple cohorts were included. In addition, the researchers tested specifically for cohort effects, thus enabling their exclusion as an influence on the results.

Lehmann et al. (2012), who examined age and gender differences in the Big Five traits from age 16 to 60, found that agreeableness and conscientiousness correlate positively with age; extraversion and neuroticism correlate inversely with age; and openness peaks during midlife. The researchers also found average gender differences, with women typically being more agreeable, extraverted, and neurotic, and men scoring higher for openness. These results are similar to those of Soto et al. (2011), although not identical.

Vecchione et al. (2012) also reported gender differences and longitudinal fluctuations in a smaller scale study of Big Five traits spanning late adolescence to early adulthood. The researchers found that adolescent females are significantly more agreeable, conscientious, and open than their male counterparts. However, adolescent males are more emotionally stable (an inverse marker for neuroticism). Openness and conscientiousness increase steadily in both genders from age 16 to 20, while extraversion

remains relatively stable. Males enjoy a slight increase in emotional stability over this period, while the trait remains stable (and lower) in females. Agreeableness rises slightly in males; in females, it increases slightly and then declines slightly, although female scores remain higher than male scores throughout adolescence. Dimension scores for conscientiousness and emotional stability vary to a greater extent among young women than among young men. These findings, for the most part, are in keeping with those of Soto et al. (2011). Other researchers have also found adolescence to be a time of change for the Big Five traits. Klimstra, Hale, Raaijmakers, Branje, and Meeus (2009) claimed that mean agreeableness and emotional stability (inverse neuroticism) dimension scores increase during adolescence.

Wortman et al. (2012) identified greater changes in trait scores among young people than their adult counterparts. The authors noted a decline in extraversion, neuroticism, and openness with age, an increase in agreeableness in early life, stability in agreeableness among the middle aged, and a decline among the elderly. Their findings indicate that conscientiousness increases steadily until late in life, when a slight decline occurs. Age-related differences in dimension scores for agreeableness, conscientiousness, and extraversion are most pronounced before age 30. In another longitudinal study of Big Five personality traits, Specht et al. (2011), also found that conscientiousness increases over the lifespan and that personality is more inclined to change in the young and elderly than in middle-aged individuals. The authors also noted that previous researchers have probably underestimated the effects of environment on personality.

Investigators have uncovered evidence that the differences between adolescents and middle-aged adults may also be underestimated. In a study that examined Big Five scores in relation to both age and behavior in everyday situations, Nettle and Fleeson (2010) found that the differences between young people and older adults were more pronounced during live interactions than their dimension scores would suggest. As with other studies, the researchers found conscientiousness scores to be higher in older adults than younger people. The findings of this research also indicate that agreeableness and emotional stability increase across the lifespan. Notably, in structured lab situations, older adults are more conscientious, extraverted, and open than their younger counterparts, indicating that these traits do manifest as actual behaviors.

### **The Big Five Traits and Social Risk Factors**

Human capital factors can have a profound influence on academic achievement (Caprara, Vecchione, Alessandri, Gerbino, & Barbaranelli, 2011), which can in turn affect future earning potential (Sum, Khawaja, & McLaughlin, 2009), thereby creating a vicious circle for those trapped in low-income environments. However, there is evidence that Big Five traits can influence academic achievement over and above the effect of social risk factors. Caprara et al. (2011) reported that openness is associated with academic self-efficacy at age 13 (which in turn predicts academic achievement), even when controlling for SES. They found that at the same age, conscientiousness affects grades in high school, increasing academic self-efficacy by age 16. These findings indicate that innate traits may allow individuals to increase their SES over time despite starting from a disadvantaged position.

There is also evidence that social risk factors which contribute to SES may alter personality formation. In an examination of the Big Five personality traits and human capital, Jonassaint et al. (2011) discovered that current SES and childhood SES (as indicated by the mother's or father's level of education) has a significant effect on personality. Looking at participants' current SES and their mothers' educational levels, high SES correlates positively with extraversion and openness. When the measure used is current SES plus fathers' education levels, neuroticism tends to be higher than average and conscientiousness lower among low-SES individuals. Jonassaint et al. (2011) did not provide evidence that race or gender affected the findings. Overall, the results of this study indicated a more positive personality profile with high SES, and showed that conscientiousness, the trait most strongly associated with health behaviors (Bogg & Roberts, 2004), may vary not only with current human capital factors, but also with the educational level of the male parent.

Other researchers have found links between SES factors, personality, and health. Chapman, Fiscella, Kawachi, and Duberstein (2010) reported that personality factors could explain approximately 20% of the SES mortality gradient. Furthermore, the authors asserted that although some of the heightened mortality risk among low-SES individuals is attributable to health behaviors, engaging in risky health activities does not explain all of the variance. The authors noted that personality and SES likely interact in a bidirectional manner, along with other factors, to affect health both directly and via health-related behaviors. This is evidenced by the clustering together of low-SES environments and personality factors that predispose individuals to ill health.

## **Risky HIV-Related Health Behaviors and Personality**

Researchers have linked a number of risky HIV-related health behaviors to the Big Five personality dimensions. Evidence suggests that short-term mating correlates negatively with agreeableness (Schmitt & Shackelford, 2008), and conscientiousness relates negatively to all risky sexual behaviors, including having sex with a large number of partners, failing to use protection, engaging in risky sex acts, choosing riskier partners (Bogg & Roberts, 2004), and short-term mating (Schmitt & Shackelford, 2008). In contrast, extraversion associates positively with risky sexual behaviors in multiple nations (Schmitt & Shackelford, 2008; Zietsch et al., 2010). There is also some evidence that neuroticism (Zietsch et al., 2010) and openness (Vollrath et al., 1999) predict risky sexual behaviors to some degree. Impulsivity, which researchers have associated with both neuroticism (Hampson & Goldberg, 2006) and extraversion (Costa & Terraciano, 2004), also exhibits a link to reduced perception of risk associated with sexual behavior (Mehrotra et al., 2009). Sensation seeking is akin to excitement seeking, a proclivity connected to extraversion (Digman, 1990); according to Charnigo et al. (2013), this tendency also predicts risky sexual behaviors in young adults. However, not all researchers have found that sensation seeking predicts sexual risk taking among MSM (Mustanski et al., 2011). Interestingly, Turchik et al. (2010) claimed that higher extraversion scores and lower agreeableness scores predict sexual risk taking among young men, but not young women.

Mustanski et al. (2011) conducted a review of the literature that yielded conflicting results regarding the impact of personality factors such as neuroticism and

extraversion on sexual risk taking. However, the authors asserted that personality may influence other behaviors such as substance abuse that in turn increase the likelihood of taking sexual risks. The authors noted that few studies have focused specifically on young MSM, so it is difficult to determine whether personality factors are more or less influential among this group.

Lynn (2010), who studied the interactional effects of personality and situation on risky sexual behaviors, found that young adults have a tendency to behave differently from one situation to the next. In particular, they are more likely to take risks in ambiguous or novel situations. The researcher concluded that we can only understand the influence of personality on risk taking by taking situational context into account. Therefore, situational factors may moderate the influence of age and SES on the likelihood of engaging in health behaviors that put individuals at risk for HIV infection.

### **HIV Testing and Personality Factors**

A number of researchers have found links between Big Five personality dimensions and behaviors that put individuals at risk for HIV infection (Bogg & Roberts, 2004; Charnigo et al., 2013; Mehrotra et al., 2009; Schmitt & Shackelford, 2008; Turchik et al., 2010; Zietsch et al., 2010). However, a comprehensive review of the literature turns up very little research into the influence of personality on HIV-related issues such as preventative strategies, testing, and self-care among the infected. Although a search of prior studies indicated that many researchers have looked at the influence of personality disorders on HIV-related behaviors or examined personality dimensions in relation to risky sexual behaviors, only two studies were found that specifically examined the five-

factor model in terms of HIV testing. Johnson (2000) reported that neuroticism associates positively with both heightened perceived HIV risk and desire for HIV testing, while Hagger-Johnson and Shickle (2010) found that conscientiousness does not predict HIV testing, possibly because conscientious individuals are less inclined to engage in risky health behaviors and therefore may perceive themselves to be at low risk for infection. On the other hand, there has been a significant amount of research undertaken to examine the influence of age and SES on the likelihood of engaging in behaviors that put individuals at risk for HIV infection.

Table 5 provides an overview of the interacting effects of Big Five personality dimensions and social factors that influence the likelihood of engaging in high-risk sexual behaviors and seeking HIV testing. As can be seen from this summary of prior research, the linkages are complex and there has not yet been sufficient research undertaken to draw firm conclusions. In some cases, there is a clear alignment of direct and indirect effects. Neuroticism has been associated with a propensity for sexual risk-taking (Zietsch et al., 2010) combined with a tendency toward lower social status and human capital (Jonassaint et al., 2011), which in turn predicts poor health outcomes (Lucey, 2007; Matthews & Gallo, 2011). However, in other cases, such as that of extraversion, the relationship is not so clear, given that this trait predicts sexual risk-taking (Schmitt & Shackelford, 2008; Zietsch et al., 2010), which puts individuals at heightened risk for disease, but also high human capital (Jonassaint et al., 2011), which has a protective effect on health (Aday, 2001; Lucey, 2007; Matthews & Gallo, 2011).

### **Conceptual Model**

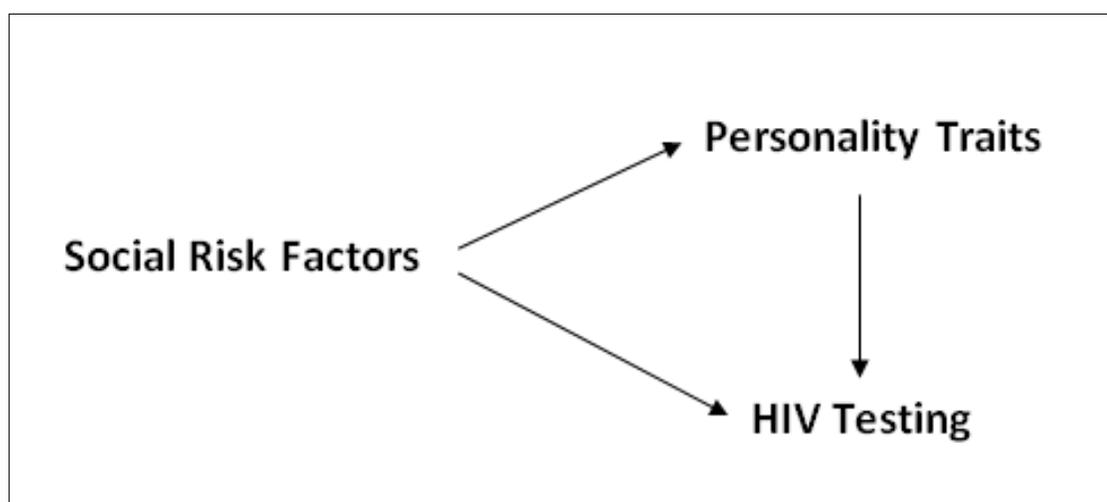
A significant body of empirical evidence links the Big Five personality dimensions with risky health behaviors such as unprotected sexual activity (Schmitt & Shackelford, 2008; Zietsch et al., 2010). There is also evidence that social risk factors increase the likelihood of engaging in risky health behaviors (Bauermeister et al., 2009; Pampel et al., 2010) and reduce the likelihood of HIV testing (Johns et al., 2010). Researchers have shown that Big Five personality dimension scores change with age (Donnellan & Lucas, 2008; Hampson & Goldberg, 2006; Lehmann et al., 2012; McCrae & Terracciano, 2005; Soto et al., 2011; Specht et al., 2011; Vecchione et al., 2012; Wortman et al., 2012), that there are interactional effects for personality and social risk factors (Jonassaint et al., 2011), and that HIV testing rates vary by race (Benavides-Tores et al., 2012). However, no prior studies have examined the intersecting effects of personality and social risk factors on HIV testing.

Table 5

*Personality, HIV-Related Behaviors, and Socioeconomic Risk Factors*

Personality dimension	Direct effects on high-risk behaviors and HIV testing	Indirect effects via interaction with social factors
Agreeableness	Inversely associated with risky sexual activities (Vollrath et al., 1999) Positively correlated with perception of dangers associated with risky sex and drug abuse (Hermant & Mullet, 2007).	Typically plummets to its lowest point in adolescence and then increases with age (Soto et al., 2011) Higher on average among females (Lehmann et al., 2012; Vecchione et al., 2012)
Conscientiousness	Inversely correlated with all risky health behaviors (Bogg & Roberts, 2004) and positively correlated with health-protective behaviors (Takahashi et al., 2012) Positively correlated with increased perception of risk associated with dangerous sexual activities (Chauvin et al., 2007) Does not predict HIV testing (Hagger-Johnson & Shickle, 2010)	Negatively correlated with age (Donnellan & Lucas, 2008; Lehmann et al., 2012; Soto et al., 2011) Typically higher in females (Schmitt et al., 2008). Positively correlated with human capital (Jonassaint et al., 2011)
Extraversion	Correlated with reduced perception of risk associated with high-risk sexual activities (Chauvin et al., 2007) and increased likelihood of engaging in risky sexual behaviors (Schmitt & Shackelford, 2008; Zietsch et al., 2010)	Typically higher in females (Lehmann et al., 2012) Positively correlated with human capital (Jonassaint et al., 2011), which is linked to better health outcomes (Lucey, 2007; Matthews & Gallo, 2011) May improve social capital by strengthening social networks (Ironson et al., 2009)
Neuroticism	Positively correlated with perceived HIV risk, desire for testing (Johnson, 2000), and sexual risk-taking (Zietsch et al., 2010)	Typically higher in females (Lehmann et al., 2012) Negatively correlated human capital (Jonassaint et al., 2011) and age (Lehmann et al., 2012) Associated with poor health outcomes overall (Lahey, 2009)
Openness	Positively correlated with risky sexual behaviors (Vollrath et al., 1999)	Typically higher in males (Lehmann et al., 2012) Increases in males during late adolescence (Soto et al., 2011) Positively correlated with human capital (Jonassaint et al., 2011)

The established linkages between personality, social risk factors, and various health-related behaviors suggest that both personality and social factors influence HIV test-seeking behavior. Big Five personality dimensions may affect HIV testing by causing individuals to favor particular risk control and coping strategies. They may also interact with social risk factors to influence attitudes toward health risks in general and the likelihood of seeking HIV testing in particular. Based on these possible influences, the conceptual model for this study, as this research envisions, is presented in Figure 4.



*Figure 4.* Conceptual model.

The conceptual model shown above indicates that social risk factors including youth, African American race, low human capital, and low social capital influence HIV testing both directly and indirectly via their effects on personality. Furthermore, it assumes that personality traits directly influence HIV testing rates among young AAMSM. Personality, as delineated by the Big Five dimensions, is central to the conceptual model used for this research and is the unifying concept through which the influence of established social risk factors on HIV testing behavior will be explored.

Young AAMSM were chosen as the population of interest because they represent a particularly high-risk group for HIV infection, a significant percentage of this population avoids HIV testing, and evidence suggests that a high prevalence of unrecognized HIV infection exists in this group (Outlaw et al., 2010). My investigation was guided by the conceptual model and analyzed using logistic regression techniques with attention to direct effects, indirect effects, and interactions.

### **Conclusion**

A variety of personality theories have contributed to the development of the Big Five model of personality, which encompasses five factors: agreeableness, conscientiousness, extraversion, neuroticism, and openness. The findings from a large and diverse body of research indicate that this model has predictive value for a broad array of outcomes, ranging from education to employment to health and longevity. Previous research has associated all five factors in this model with various health behaviors, both those that preserve health and those that put it at risk. Therefore, it is quite possible that the Big Five model has predictive value for HIV test seeking behavior as well. To date, researchers have given this possibility almost no attention, and no other researchers have conducted studies examining the influence of personality factors on HIV testing rates among young AAMSM in particular.

This study was premised on the theory that one or more of the Big Five personality dimensions will have predictive value for HIV testing rates among young AAMSM, and that social risk factors exert both direct effects on HIV testing rates and indirect effects by influencing personality factors. The literature review presented in this

chapter showed that social risk factors have significant impacts on the likelihood of engaging in risky sexual behaviors and seeking HIV testing. It also showed that young AAMSM are less likely to undergo testing for HIV infection and more likely to have undiagnosed HIV than young MSM of other races. These issues, along with the ability of the Big Five personality model to predict HIV testing rates among young AAMSM, were explored using the quantitative methodology described in the next chapter.

## Chapter 3: Research Methods

### **Introduction**

The purpose of this research was to identify the socioeconomic and personality factors that influence HIV testing among young AAMSM. In this chapter, I present the research design and the rationale supporting my design choice. I also present the details of the methodology, including the target population and sampling design, as well as the recruitment procedures for the study sample. Next, I discuss the measurement instrument, the reliability and validity of that instrument, and the additions and modifications to the instrument as required for the investigation. I further specify the study variables and discuss how those variables were operationalized. A discussion of the data collection procedures and sampling technique follows, as does the analysis plan and a discussion of the relationship of each analysis to the respective research question(s) and hypotheses. Next is a review of the potential threats to validity and how the methodology addressed these threats. I complete the chapter with a discussion of the ethical considerations and procedures adhered to in this investigation and a summary section reviewing the main points of Chapter 3.

### **Research Design and Rationale**

This investigation was quantitative and cross sectional. The study intent was to explain the dependent variable, HIV testing behavior among AAMSM, by testing the relationships and relative contributions of potentially influential factors on the study behavior. The independent variables were personality traits, as defined by the Big Five

Personality scale, and the social risk factors of age, education, income, employment, housing, and marital status.

This research is consistent with the assumptions inherent in the postpositivist research philosophy that underpins quantitative research (Creswell, 2009). Those assumptions include the understanding that knowledge is shaped and extended through the systematic examination of empirical observations that are carefully measured and analyzed statistically. Quantitative methods are used when the study goal is to determine the strength of associations among predetermined variables in order to explain or predict a given phenomenon (Creswell, 2009).

The goals of qualitative research differ from the goals of quantitative research. Qualitative methods are used to explore and comprehend the meanings people assign to experiences and social phenomena. Qualitative research identifies influential factors by evaluating the connotations embedded in the written word, spoken word, or observable behaviors. The relationships between or among variables are not hypothesized a priori, and the goal of qualitative research is to describe and understand, not to test relationships between variables to explain, infer, or predict. My research questions required that I test hypothesized relationships among carefully measured established variables using statistical tests of probability and, consequently, were inconsistent with the use of qualitative methods.

The investigation was cross-sectional rather than experimental because the independent variables were personal characteristics and preexisting social influences that were not open to manipulation. Further, the research questions required that the

dependent variable be studied in the community setting, not under the artificially controlled conditions of a laboratory environment. The lack of a naturally occurring intervention also eliminated the use of a quasi-experimental design. The research questions focused on the frequency of HIV testing behavior in the target population over a specific time period. Consequently, the study intent was not consistent with the use of a control group, and a cross-sectional approach was justified.

Given the time element in this investigation, a longitudinal investigation would have been the ideal design choice, but because HIV testing records do not contain the information necessary to capture study variables, a retrospective longitudinal investigation was impossible. A prospective longitudinal investigation was consistent with the research questions, but the literature is clear that the target population is transient, secretive, and potentially noncompliant with the collection of data over time. This characteristic of the study population, coupled with investigator resource constraints in terms of time and money, necessitated the use of a cross-sectional design.

### **Population**

The population with which this research was concerned was young AAMSM. The most recent figures available indicate that 3.4% of the U.S. population identifies as lesbian, gay, bisexual, or transgender (LGBT), with 3.3% of men identifying as such (Gates & Newport, 2012). Among men aged 18–29, 4.6% identify as LGBT. African Americans were also more likely to identify as LGBT (4.6%; Gates & Newport, 2012).

A number of problems exist in this estimate, such as including transgendered individuals (a gender orientation rather than a sexual orientation), failure to define sexual

orientation boundaries, and failure to capture MSM who primarily engage in opportunistic sex with other men. These are common problems when attempting to measure the size of LGBT populations (Parks, Hughes, & Werkmeister-Rozas, 2012). Additional problems include self-identification stigma and the impact of antigay sentiment, which lead to significant underestimations of population sizes for this group (Coffman, Coffman, & Ericson, 2013). Hidden populations may also be engaged in behavior that is either explicitly illegal or socially stigmatized, and members of these populations may feel ambivalent about their participation (Shaver, 2005).

Under these conditions, AAMSM must be considered to be a hidden population. A best estimate of the size of the population is about 279,000. This estimate is based on Gallup figures and 2010 United States Census data indicating that 13.1% of the United States population identifies as African American only. This is a very weak estimate, as it does not include those who report mixed-race heritage and does not take into account cohort differences in race/ethnic distribution. It is thus probably a significant underestimation of the actual MSM population. The population for this study was operationalized as African American men aged 18 to 30 who engage in sexual activities and/or relationships with other men (regardless of stated sexual orientation). This did not exclude men who engage in sexual activities with both men and women, or depend on the extent of sexual activities.

### **Sample and Sampling Methodology**

**Sample strategy.** The nature of AAMSM as a hidden population precluded the use of probability sampling. Instead, this study used respondent-driven sampling (RDS).

RDS is a variant of the older snowball sampling technique, where participants are asked to pass the survey to other potential participants (Heckathorn, 1997). Snowball sampling is effective in reaching sparse populations, but zealous participants can bias the sample by recruiting too heavily from limited social networks. In RDS, participants are asked to recruit only two additional participants. The researcher tracks each recruiter's yield to control bias (Kendall et al., 2008). This sampling approach creates waves that enable the researcher to track penetration into the population. According to Kendall et al. (2008), four or five waves are usually enough to achieve a balanced distribution of participants in population access. Direct comparison of RDS to snowball sampling, time-location sampling, and other non probability sampling techniques showed that RDS was more effective at reaching MSM populations (Kendall et al., 2008).

**Inclusion criteria.** For purposes of this study, I defined young AAMSM as ranging in age from 18 to 30. The upper age limit was based on literature indicating that brain maturity is not complete until the latter part of the third decade of life (Gottesman & Hanson, 2005). The lower limit was based on both ethical and practical considerations.

Individuals under 18 cannot legally consent to participate, may be unwilling to seek consent from their guardians, and may face negative family reactions if they do seek their guardians' consent. They were thus excluded from the study. To avoid cohort effects (Gravetter & Forzano, 2010), I limited the sample to AAMSM aged 18–30 years, based on previous research (Caspi et al., 1997). I also limited the sample to the AAMSM population in the United States. This research also included those who used home testing

kits. These testing kits are newer and less common than traditional testing but provide broader access to testing.

**Sample size.** I determined the sample size using both statistical and pragmatic considerations (van Belle, 2011). Statistical issues included acceptable limits of type I and type II errors and the type of statistical test used. Pragmatic concerns included time and monetary resources and availability of appropriate participants. In this case, I used a priori power analysis, because it can be used as a guideline for sample size prior to research (Faul, Erdfelder, Buchner, & Lang, 2009). A priori power analysis identifies the required sample size for a particular statistical test in order to find results at a particular statistical power or effects size. I used G\*Power 3.1 to determine sample size, based on tests to determine sample size (Faul et al., 2009). I selected the tests based on a scalar discrete dependent variable (number of tests taken in a year).

Table 6 shows the tests and sample sizes calculated for this study. I calculated all tests at a medium effects size ( $\rho = 0.5$ ), standard confidence interval ( $\beta = 0.05$ ), and standard confidence level ( $1-\beta = 0.95$ ). These tests resulted in a required sample size of between 35 and 42 participants; the intended sample size was set at  $n = 50$ .

Table 6

*Sample Size Calculations Generated Using G\*Power 3.1*

Test	Sample size
Correlation (point biserial, two-tailed)	42
Multiple linear regression	35

**Recruitment strategy.** I conducted recruitment in online forums oriented to interests of AAMSM, as well as in person among contacts in the community. Groups from which I sought participants included, but were not limited to, the National Black Gay Men's Advocacy Coalition and regional Facebook groups. Recruitment targeted the AAMSM population in the United States. This included all men who have sex with men and did not exclude men based on sexual orientation. As recruitment occurred primarily through social media, the locations of respondents were tracked by questionnaire. The sampling strategy was operationalized using initial screening questions and referral codes, using a standard approach to RDS (Heckathorn, 1997; Kendall et al., 2008; Monette, 2013).

I began the recruitment process by extending an open invitation to communities and individuals, as well as reaching out to my own contacts as appropriate, in order to recruit the initial participants (Heckathorn, 1997). The invitations included a general statement about the purpose of the study and a link to find more information online. Participants completed the consent process (described below) and then the questionnaire. On completion of the questionnaire, participants were assigned a serial number, which they were asked to provide to members of their social network in the target population. On screening, participants were asked to estimate how many people they knew in the target population. They were also asked to provide the serial number of the person who recruited them. Each serial number was used only twice. This limited the number of participants each individual could recruit and made it easier to determine how many waves had been reached (Monette, 2013). I used Response Driven Sampling Coupon

Manager (RDSCM) and Response Driven Sampling Analysis Tool (RDSAT) software for sample management and data preparation (Heckathorn, 1997). These RDS specialized tools compensate for nonrandomness (Heckathorn, 1997).

**Informed consent.** Participants who initially indicated interest in the study were directed to an online survey site, which included a full letter of disclosure. Instructions explained that the survey was for AAMSM between ages 18 and 30 and that participants could opt out of the survey at any time. The term *MSM* was clearly explained in order to allow potential participants to decide whether it fit their personal identification. The site further informed participants that they could withdraw from the study at any time by closing the window, and that they could choose not to answer any question that made them uncomfortable or caused them stress. The letter of disclosure also included information about contact details for the researcher and supervisor, IRB approval, and the detailed purpose of the study. Participants were asked to indicate that they understood the letter prior to display of the questionnaire. Clicking through to the questionnaire served as consent to the survey.

**The survey process.** The questionnaire began with the screening question(s), which ensured that the potential participant was a member of the target population and target age group. Respondents who did not meet the study inclusion criteria were thanked for their time and released. I did not collect any personally identifying information. On exiting the study, participants were asked to indicate whether they wanted to receive follow-up information from the study; if so, they received an access code and a link to a secure site where I shared the results upon completion of the study. They were also

reminded of my contact information in case they had any questions. There was no direct follow-up.

The second stage of participant recruitment was referral. On completion and submission of the questionnaire, participants were thanked and asked if they were willing to refer friends or acquaintances to complete the study. If so, they were issued a serial number, which was uniquely generated to indicate wave and referral participant(s). This was consistent with RDS techniques, which are intended to limit the number of total referrals from each participant (Heckathorn, 1997; Kendall et al., 2008). The participants were then asked to distribute the referral numbers and a URL for the study in whatever way made them most comfortable. I did not place limitations on the transmission mechanisms in an effort to enable participants to distribute codes as they were most comfortable doing so. Once each serial number had generated two referral participants, I excluded questionnaires from successive participants referred from that serial number.

It was expected that, beginning with five seed participants, a maximum of five rounds of referral would be required to meet sample size requirements. This was consistent with previous findings about the number of waves required for achieving randomness (Heckathorn, 1997; Kendall et al., 2008). The goal was to complete the survey collection within 1 month. At the end of 1 month, I closed the survey and began the data preparation analysis.

## **Instrumentation**

I used two measurement instruments: the Big Five inventory personality framework (a public scale in the public domain) and a social risk factor questionnaire developed for this investigation. I discuss each instrument in turn.

**Big Five inventory.** As its name indicates the Big Five model of personality measures five specific personality dimensions, which are agreeableness, conscientiousness, extraversion, neuroticism, and openness (Hampson & Goldberg, 2006). Studies cited in the literature review overwhelmingly support the use of the Big Five model of personality for this study because one's personality contributes to health-related behavior in general, and more specifically HIV-related behavior (Bogg & Roberts, 2004; Charnigo et al., 2013; Mehrotra, Noar, Zimmerman, & Palmgreen, 2009; Schmitt & Shackelford, 2008; Turchik et al., 2010; Zietsch et al., 2010). As a result, instruments that assess personality characteristics such as the Big Five can provide insight into different choices regarding HIV testing.

I used John and Srivastava's (1999) version of the Big Five Inventory (BFI) to measure the Big Five personality constructs. The BFI is a third generation Big Five personality trait measure developed in response to the NEO-PI-R, the unwieldy and tedious 240-item measure originally developed by Costa and MacCrae (1992). The BFI is a 44-item scale that captures the core prototypical structure of the five agreed-upon traits (John, Naumann, & Soto, 2008).

John et al. (2008) noted that the BFI instrument was developed to define prototypes from a range of studies, many of which had formulated different personality

traits and structures. This prototypical definition involved expert sorting of 300 items from an Adjective Check List (ACL), defined from previous studies, into the five Big Five categories and “other,” followed by factor analysis to determine inclusion. The BFI was “developed to represent the Big Five prototype definitions as a canonical representation of the factors intended to capture their core elements across the particulars of previous studies, samples, or instruments” (John et al., 2008, p. 129). Thus, rather than being a single representational measure, it is intended to provide an overall view based on a core definition. The factors were initially validated using factor analysis in a large sample of students. Convergent validity correlations averaged 0.55 (ranging from 0.47 (Conscientiousness) to 0.67 (Extraversion)). The test has a high degree of reliability. John et al. (2008) noted that American and Canadian samples showed alpha scores averaging above 0.80 (range 0.75 to 0.90). The authors also compared to two other measures of five-factor personality tests, finding substantially similar internal consistency (alpha), convergent validity correlations, and CFA coefficients across the BFA, NEO-FFI, and TDA instruments in a population of undergraduate students ( $n = 829$ ). These alpha reliabilities were calculated on a sample similar to this study (university students;  $n = 829$ ). Of these instruments, the version of the BFI that was used in the present study had an alpha reliability score of 0.83. Across instruments, Extraversion, Conscientiousness, and Neuroticism garnered the highest reliability scores, while Agreeableness and Openness were less reliable (John & Srivastava, 1999). The reliabilities for individual traits on the BFI were as follows: Extraversion—0.88; Agreeableness—0.79; Conscientiousness—0.82; Neuroticism—0.84; and Openness—0.81. The overall mean

was 0.83 (John & Srivastava, 1999, p. 62, Table 3). However, one caveat regarding validity could be the existence of a body of literature that is critical of the Big Five personality model, questioning its methodology and scope. Overall, the development and reliability of the BFI support the use of the instrument in this population.

**Social risk factors.** For this portion of the research I looked extensively to Aday's (2001) model of social vulnerability because it contains several social factors that help shape outcomes and actions in terms of health and health-related issues. The social risk factors that were relevant for the present study and needed to be measured include age, income, education, employment, housing and marital status. Race, gender, and sexual orientation (if known) were controlled by the sample selection. These risk factors can be grouped into three categories. The first category includes factors that play a role in social status such as age and race. The second is comprised of human capital factors including income, educational attainment level, employment status, and housing. Finally, the third consists of various social capital factors such as family support, social networks, and other social elements in the broader community that may offer support or assistance.

The dimensions used in this sector are primarily standard sociological and demographic variables, and do not require the establishment of detailed conceptual domains. This is a deliberately simplified view that does not critique, for example, the social enforcement of gender norms into a binary, preassigned, and constrained system (Sloop, 2004). In general, the risk factors identified are supplied by previous sociological studies. Race/ethnicity, gender, and sexual orientation are typically measured using

agreed-upon categories (Wallace, 2009). In this case, these categories were used for selection.

The components of human capital (income, educational attainment, employment, and status) are inherent in its definition, as well as previous work in human capital for development (Becker, 2009). They are also defined using standard and agreed-upon categories, based on existing measurements and social structures (Aday, 2001). For example, educational attainment level is typically measured as the last educational milestone completed (such as high school graduation, college graduation, etc.). These components are essentially socioeconomic status (SES) variables (LeVeist, 2011). These variables are justified because they have been shown previously to have an impact in the health-related actions and outcomes of ethnic minority residents in the US (Aday, 2001; LeVeist, 2011).

Social capital factors are less firmly defined (Aday, 2001), and are often contextual. Aday (2001) provides definitions for social networks and social supports, focusing on family, friends, and formal supports including therapists and social workers. These are also used by LeVeist (2011) to identify social supports. The definitions from these sources were used to operationalize variables in this section.

**Reliability and validity.** Previous research conducted by Aday (2001) utilizing community and individual factors that play a role in predicting health have demonstrated a pattern of consistency, and all of the social risk factors included in the present study have been tested by a variety of other researchers as highlighted in the Literature Review. The instrument was monitored for internal consistency throughout the course of the

study, which helped establish and maintain the reliability of the social risk categories included. A pretest with expert review of the items was used to make sure the instrument had construct validity (face validity). Pretesting was used in order to make sure that items were consistent with expectations, made sense, and reflected the underlying constructs they were meant to reflect (Colton & Covert, 2007). This was a concern in my study, since the social risk factors were based on previous work of Aday (2001), LeVeist (2011), and others, but were untested in the population under consideration and using the specific wording of the study. Pretesting helped to make sure the instrument was appropriate for the study, and also ensured that multi-item scales (which were used for social risk factors, though socioeconomic and demographic risk factors were measured with single items) remained consistent (Colton & Covert, 2007).

In terms of some of the more complex questions regarding social risk factors, it may prove useful to address the idea of being married versus being single to include other variables, such as being in a committed relationship as some of the participants may be in same sex or other variations rather than marriage. All of the sample population came from all regions of the United States, which contributed to the external validity of the study. Additionally, there were some aspects within the social risk factors that required clarification and adjustment to help establish validity. For example, it was important to ensure that only individuals within the target age group were permitted to participate, so age was used as a screening question. The education level as a measure of human capital was also subdivided to measure different behaviors among participants who left school prior to high school graduation versus those who graduated from high school or obtained

postsecondary education. Employment status, also included in human capital, represented another set of unanswered questions that benefited from clarification. Given the population being targeted as well as presence of factors relating to vulnerability, it was necessary to address categories of employment, such as full-time versus part-time employment status. Part-time employment in particular was important to consider as many part-time jobs do not provide benefits, such as medical coverage.

**Pilot test.** In order to make sure the instrument was reliable, the items were understandable, and the data collection process was effective, a pilot test was conducted. The pilot test involved sending the URL link of the online questionnaire to an initial five participants volunteer group, along with a feedback form. Participants were asked to complete the online questionnaire and then the feedback form. The feedback form asked specifically about the amount of time taken for the questionnaire, whether there were any problems or difficulties completing the questionnaire, and any other issues that may have occurred. Any potential problems or difficulties identified in the participants' feedback form were addressed to ensure that the final online data collection process functioned as intended. This helped make sure the instrument was prepared appropriately when the final data collection process began.

### **Operationalized Independent Variables**

The independent variables for this study were organized into two major categories.

**Personality Traits**

Personality traits were assessed with the Big Five Personality Factors. The personality survey yielded continuous scores for the following personality characteristics: agreeableness, conscientiousness, extraversion, neuroticism, and openness.

**Social Risk Factors**

The second set of independent variables was social risk factors. All the variables were created by the researcher and assessed with objective questions. Thus, reliability and validity were not applicable for these variables.

**Education level.** Education level was an ordinal scaled discrete measurement and was categorized as follows: did not complete high school; high school graduate, GED or equivalent; some college; undergraduate degree; graduate degree.

**Income level.** Income level was an ordinal scaled discrete measurement with the following categories: less than \$10,000; \$10,000–\$20,000; \$20,001–\$30,000; \$30,001–\$40,000; more than \$40,000.

**Employment.** Employment was a nominal scaled discrete measurement with the following categories: full-time (35 hours a week or more); part-time (less than 35 hours a week); unemployed; retired.

**Housing.** Housing was a nominal scaled discrete measurement with the following categories: own current residence; rent current residence; staying with family or friends; homeless.

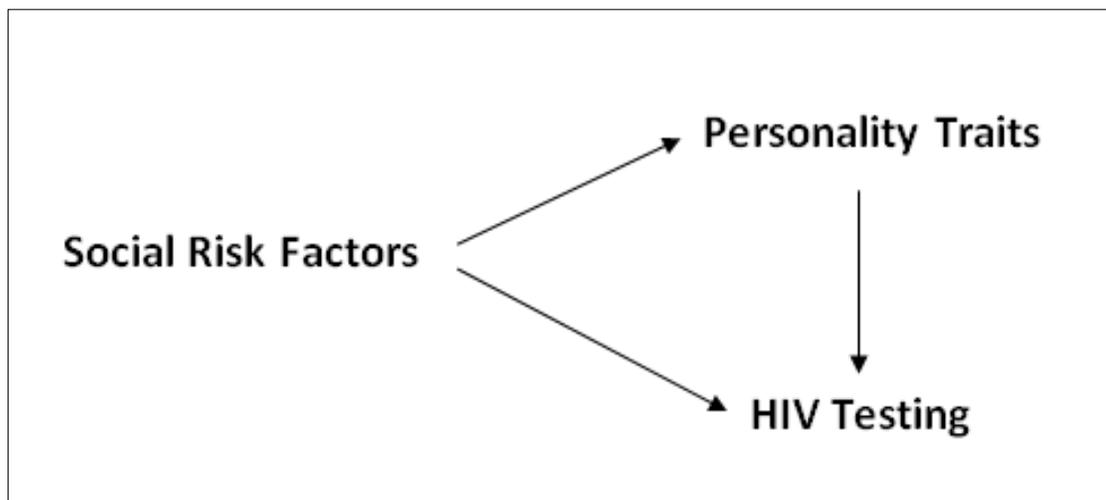
**Marital status.** Marital status was a nominal scaled discrete measurement with the following categories: single, never married; committed relationship, not married; married; separated; divorced; widowed.

**Age.** Age was a ratio scaled variable. Only individuals between the ages of 18 to 30 were included in the study.

### **Operationalized Dependent Variable**

#### **HIV Testing**

The HIV testing behavior was nominal scaled and dichotomous (tested with the last 12 months or not tested within the last 12 months). The researcher asked each participant whether or not they had taken a clinical HIV test or an in-home HIV test within the last 12 months. The research questions and hypotheses are consistent with the study conceptual model once again in Figure 5.



*Figure 5.* Conceptual model.

## Research Questions and Hypotheses

**Research Question 1.** Is there a statistically significant association between the participants' personality traits as measured by the Big Five and having an HIV test within the last 12 months?

H<sub>0</sub>: There will not be a statistically significant association between the participants' personality traits as measured by the Big Five and having an HIV test within the last 12 months.

H<sub>A</sub>: There will be a statistically significant association between the participants' personality traits as measured by the Big Five and having an HIV test within the last 12 months.

**Research Question 2.** Is there a statistically significant association between the participants' social risk factors as measured by (age, education, employment, housing, income, and marital status) and having an HIV test within the last 12 months?

H<sub>0</sub>: There will not be a statistically significant association between the participants' social risk factors as measured by (age, education, employment, housing, income, and marital status) and having an HIV test within the last 12 months.

H<sub>A</sub>: There will be a statistically significant association between the participants' social risk factors as measured by (age, education, employment, housing, income, and marital status) and having an HIV test within the last 12 months.

**Research Question 3.** Does the relationship between participants' personality traits as measured by the Big Five, and social risk factors as measured by age, education, employment, housing, income, and marital status influence having an HIV test within the last 12 months?

H<sub>0</sub>: The relationship between participants' personality traits as measured by the Big Five and social risk factors as measured by age, education, employment, housing, income, and marital status will not influence having an HIV test within the last 12 months.

H<sub>A</sub>: The relationship between participants' personality traits as measured by the Big Five and social risk factors as measured by age, education, employment, housing, income, and marital status will influence having an HIV test within the last 12 months.

### **Data Analysis Plan**

The following section details the analytical approach that I used to assess each research hypothesis. All statistical tests were conducted at  $\alpha = .05$ .

**Research Question 1.** The statistical analysis that was conducted to address Research Question 1 was a multiple binary logistic regression. The binary logistic regression is appropriate when predicting a dichotomous dependent variable from one or more predictors (Stevens, 2002; Tabachnick & Fidell, 2007). The Big Five Personality scales (agreeableness, conscientiousness, extraversion, neuroticism and openness) were the predictors, and participants' HIV testing behavior was the criterion. The criterion was operationalized as whether or not the participant had taken an HIV test (either traditional

or at-home test) within the last 12 months. The model assessed whether the predictors could correctly classify individuals who had been tested for HIV within the last 12 months. All of the predictors were continuous and entered directly in the regression model. The following dummy coding scheme was used for the criterion: 0 = no HIV testing within last 12 months, 1 = HIV testing within the last 12 months.

Prior to analysis, I screened the data for outliers. Any participant identified as an outlier was removed before running the logistic regression model. I also computed the variance inflation factors to assess the effects of multicollinearity on the model.

A classification table and tables of regression coefficients were also displayed. The test assesses the significance of the omnibus model including an estimate of  $R^2$ . The classification table detailed the frequency and percentage of correct and incorrect predictions of participants' HIV testing behavior.

**Research Question 2.** The statistical analysis that was conducted to address Research Question 2 was a multiple binary logistic regression. The social risk factors were the predictors, and participants' HIV testing behavior was the criterion. The criterion was operationalized as whether or not the participant had taken an HIV test (either traditional or at-home test) within the last 12 months. The model assessed whether the predictors could correctly classify individuals who had been tested for HIV within the last 12 months.

Age was continuous and entered directly in the regression model. However, education level, income, employment, housing and marital status were discrete and dummy coded for model entry. The following dummy coding scheme was utilized for the

predictors. Education level was dummy coded as follows with those who did not complete high school as the reference group. The other education categories were high school graduate; GED or equivalent; some college; undergraduate degree; graduate degree. Income level was dummy coded with those making less than \$10,000 as the reference group. The other income level categories were \$10,000–\$20,000, \$20,001–\$30,000, \$30,001–\$40,000, and more than \$40,000. Employment was dummy coded with unemployed as the reference group. The other employment categories were full-time (35 hours a week or more), part-time (less than 35 hours a week), and retired. Housing was dummy coded with those who own current residence as the reference group. The other housing categories were rent current residence, staying with family or friends, and homeless. Finally, marital status was dummy coded with single, never married as the reference group. The other marital status categories were committed relationship (not married), not married, married, separated, divorced, and widowed. The following dummy coding scheme was used for the criterion: 0 = no HIV testing within last 12 months and 1 = HIV testing within the last 12 months.

Prior to analysis, I screened the data for outliers. Any participant identified as an outlier was removed before running the logistic regression model. I also computed the variance inflation factors to assess the effects of multicollinearity on the model.

A classification table and tables of regression coefficients were also displayed. The test assessed the significance of the omnibus model including an estimate of  $R^2$ . The classification table detailed the frequency and percentage of correct and incorrect predictions of participants' HIV testing behavior.

**Research Question 3.** A hierarchical multiple binary logistic regression (Stevens, 2002; Tabachnick & Fidell, 2007) was conducted to address Research Question 3. The social risk factors were the predictors, the Big Five personality traits were covariates. The criterion was participants' HIV testing behavior. The participants' standardized residuals were used to assess the influence of the outliers in the data as described above. The researcher also computed the variance inflation factors to assess the effects of multicollinearity on the model. The dummy coding scheme for the discrete predictors and the criterion was the same as described in model 2.

The regression proceeded in two steps. Step 1 included the covariates (i.e., Big Five personality scales). Step 2 included the covariates with the addition of the predictors (i.e., social risk factors). The strength of the predictor model was assessed by the significance of  $\Delta R^2$  from step 1 to step 2. A classification table and tables of regression coefficients were also displayed.

### **Threats to Validity**

The biggest threat to validity was due to the fact that the study used a cross-sectional design and nonrandom sampling. The use of the cross-sectional design always carries with it certain threats to internal validity when compared to some other types of research design. The establishment of specific screening criteria for sample selection is one way to increase internal validity, and this has been included in the research design for my study. As mentioned previously, the characteristics of the population under study as well as limitations pertaining to various resources available to investigators made a cross-sectional design the only feasible choice.

Also, because of the use of nonrandom sampling, the study did not have external validity. The sampling was first dependent on participants choosing whether or not to complete the questionnaire. Then, those who completed the study were required to decide whether or not to refer others, who then decided if they wished to participate. All of the sampling was dependent on a degree of participant self-selection, which has its own risks in terms of validity and bias. Furthermore, being included in the sample was left more to chance, participation in social media or online communities, being acquainted with someone who participated in some cases such as in the second wave, than simply being a member of the target population. AAMSM who did not frequent online communities or who may be more secretive about their activities were less likely to have an opportunity to participate. As mentioned earlier, the use of Response Driven Sampling Coupon Manager (RDSCM) and Response Driven Sampling Analysis Tool (RDSAT) software addressed various validity issues connected to nonrandom sampling.

However, as the Big Five test and the social risk factors used in the present study have demonstrated integrity and consistency in studies by others, external validity, particularly in terms of generalizability, was easily established. One possible risk to validity was due to the elasticity of some of the variables, such as marital status, which although it could be assumed that “marriage” refers exclusively to a legal union between one male and one female, the studies cited may not necessarily be using a uniform definition of the term. Even something as deceptively simple as gender may not be so simple when focusing on AAMSM. This population includes individuals who identify as

a gender that is different from their anatomical features. Transgendered respondents would be an example.

Another possible threat was inherent in the use of RDS. In addition to the possibility of a higher level of recruitment from the certain social circles, which was controlled for by the use of serial numbers, there was also the possibility that they might exhibit certain personality characteristics that could differ from a random sample, including some of the characteristics measured through the Big Five, in particular agreeableness and possibly extraversion or even openness.

### **Ethical Concerns**

In terms of ethical concerns, only participants who were at least 18 years old (legal adults) were eligible, which avoided the concern that some participants may not be legally permitted to take part in research without parental consent. Another ethical consideration involved the possibility of participation by vulnerable adults (although they were not intentionally recruited). Vulnerable adults in the present study could include those who are emotionally or mentally disabled, in crisis, or who reside in a facility. Other categories of vulnerable adults who were eliminated through screening would be those who are elderly. All participants were expected to be male (although there is a small possibility of participation by transgendered individuals) and the age cutoff was 30. Having said this, it is important to note that according to the IRB, it is not unethical to unknowingly include some members of the vulnerable adult population if the screening process to prevent their inclusion would be excessive in relation to the research topic. Although the survey promptly screened potential participants who followed the link from

the invitation, it was also possible to include some of the exclusionary criteria as part of the invitation itself. Participants were subjected to a detailed informed consent procedure that explained their rights, the purpose of the study, and what will be done with the data. The information letter had to be acknowledged before completing the survey.

Additionally, there were strategies built into the research design that enabled participants to choose to not answer certain questions or cease participation all together without penalty. Also, since participation was voluntary, as was the decision to refer others to the study, there should have been no reservations regarding consent. Another concern was related to the desire to avoid harm to participants. In this case, it was important that participation in the study and completion of the questionnaire did not result in any emotional harm to participants. As the participants were able to skip questions or even end participation at any time, this standard of ethics should be satisfied.

As well, anonymity should have been preserved since no identifying personal information was collected or maintained regarding study participants. In terms of privacy, general dangers included the accidental exposure of confidential information; in this case, someone might have been exposed as a member of a hidden population or possibly have had his HIV status revealed. One way to significantly reduce the chances of confidential information being breached was through the implementation of measures taken to secure the data collected, such as password protection for any electronic data. Additionally, although certain types of demographic information was collected for the present study, it is described in such a way that would make it impossible for a reader to identify individual participants; that is, no identifying information was used in the writing. For

this study, de-identified data was stored on an encrypted USB key, which will be retained for a period of five years following completion of the study (or as recommended by IRB). Only the researcher will have direct access to the data, while access could be granted to supervisors or examiners for the purpose of analytical verification if required.

Another small risk for the participants in this study was that some participants may have found the topic of the research stressful or upsetting and not want to continue the survey. Others may have been concerned about providing information about a lifestyle that they may be engaging in covertly. However, as mentioned earlier, participants did not have to answer any questions that they objected to and could stop the questionnaire at any time. Because of this, the participants should not have felt in any way coerced, either. In the event that participants found themselves distressed by the survey or its contents, they could immediately opt out of the survey.

Regarding the Big Five test that was used in the study, this particular instrument is available for noncommercial use. The copyright is held by Berkeley Personality Lab director Oliver P. John. As required by The IRB, the web site for Berkeley Personality Lab measures contains a link to download the instrument and scoring instructions. The link also includes a survey to let Berkeley Personality Lab learn a little bit about researchers who plan to use the instrument so they can consider possible improvements in the future and create a database of users.

### **Summary**

The methodology used for this investigation was both quantitative and cross sectional. The dependent variable under study was HIV testing behavior among

AAMSM, and the goal of the present study was to test the relationships and relative contributions of specified factors about behavior relating to the dependent variable. The independent variables considered were personality traits plus the social risk factors of age, education, income, employment, housing, and marital status. These independent variables are defined, respectively, by the Big Five Personality scale and the social risk factor instrument created for use in the present study. A cross-sectional investigation rather than an experimental investigation was implemented because the independent variables (personal characteristics and preexisting social influences) were fixed as opposed to open to manipulation. The study used respondent-driven sampling (RDS), which borrows from the snowball sampling technique (Heckathorn, 1997). The snowball sampling technique, like RDS, increases the sample size when participants are encouraged to pass the survey to others (Heckathorn, 1997).

For purposes of this study, I defined young AAMSM as ranging in age from 18 to 30 and included a field on the survey for participants to check their ages. Only these ages were included as options. The portion of the survey addressing age was designed to screen out individuals who are not within the designated age range so that they could not be included in the sample. It was important for participants to fall within the prescribed age range as the studies consulted for the Literature Review chapter indicated that younger AAMSM are the most likely to engage in risky sexual behavior and shun HIV testing than are more mature members of the community.

I conducted recruitment for study participants in online forums catering to the interests of AAMSM, as well as in person through contacts in the community, initiated

through outreach and the use of an open invitation (Heckathorn, 1997). The National Black Gay Men's Advocacy Coalition and regional Facebook groups were among those from which participants were recruited. Recruitment focused exclusively on the AAMSM population in the United States. The invitations summarized the purpose of the study, and included a link to access additional information online. At that point, individuals who initially expressed interest in the study were connected to an online survey site containing a full letter of disclosure. Additionally, visitors to the site were informed of their right to withdraw from the study at will by closing the window, as well as their right to avoid answering any question that made them uncomfortable.

For those who chose to participate, the questionnaire began with the screening question(s), which ensured that the potential participant belonged to both the target population and target age group. Respondents who did not meet the study inclusion criteria specified in the screening question(s) were thanked for their time and released from participation. I did not collect any personally identifying information from participants. The second stage of participant recruitment rested on referral from the first group of participants. Following completion and submission of the questionnaire, participants were thanked and asked if they were willing to refer friends or acquaintances to take the survey, and if so, they were issued a unique serial number to indicate wave and referral participant(s). This practice is consistent with RDS techniques, which are intended to restrict the number of total referrals from each participant (Heckathorn, 1997; Kendall et al., 2008). Willing participants were then asked to distribute the referral numbers and a URL for the study in whatever way they desire. For the questionnaire I

used two measurement instruments: the Big Five inventory personality framework (which is a public scale in the public domain), and a social risk factor questionnaire devised specifically for use in this investigation.

In the following chapter, I will be detailing and analyzing the results of my study in terms of how well the methodology used measured the variables examined and validated the hypotheses under consideration. After the analysis of the results there will be a discussion, ideas for future research and a conclusion.

## Chapter 4: Results

This chapter includes the results of the statistical analysis from the data collected from the primary study. The purpose of the study was to test relationships between socioeconomic and personality factors that may influence HIV testing among young AAMSM. In order to fulfill this purpose, three research questions with accompanying null and alternative hypotheses were proposed:

Q1: Is there a statistically significant association between the participants' personality traits as measured by the Big Five and having an HIV test within the last 12 months, either at a clinic or at home?

H<sub>0</sub>: There will not be a statistically significant association between the participants' personality traits as measured by the Big Five and having an HIV test within the last 12 months, either in a clinic or at home.

H<sub>A</sub>: There will be a statistically significant association between the participants' personality traits as measured by the Big Five and having an HIV test within the last 12 months, either in a clinic or at home.

Q2: Is there a statistically significant association between the participants' social risk factors as measured by (age, education, employment, housing, income, and marital status) and having an HIV test within the last 12 months, either in a clinic or at home?

H<sub>0</sub>: There will not be a statistically significant association between the participants' social risk factors as measured by (age, education,

employment, housing, income, and marital status) and having an HIV test within the last 12 months, either in a clinic or at home.

H<sub>A</sub>: There will be a statistically significant association between the participants' social risk factors as measured by (age, education, employment, housing, income, and marital status) and having an HIV test within the last 12 months, either in a clinic or at home.

Q3: Does the relationship between participants' personality traits as measured by the Big Five, and social risk factors as measured by age, education, employment, housing, income, and marital status, influence having an HIV test within the last 12 months, either in a clinic or at home?

H<sub>0</sub>: The relationship between participants' personality traits as measured by the Big Five and social risk factors as measured by age, education, employment, housing, income, and marital status will not influence having an HIV test within the last 12 months, either in a clinic or at home.

H<sub>A</sub>: The relationship between participants' personality traits as measured by the Big Five and social risk factors as measured by age, education, employment, housing, income, and marital status will influence having an HIV test within the last 12 months, either in a clinic or at home.

This chapter is arranged in three sections. First, a brief review of the outcomes of the pilot study is presented. Next, the data collection process is reviewed, including response rates and sample demographics. Third, the results of the hypothesis tests are presented and discussed, with hypothesis outcomes being specified.

### **Pilot Study**

The pilot study was conducted in a sample of five volunteers (nonpopulation members, to avoid depleting the population). The survey link and a feedback form were sent to the volunteers on February 3, 2015. Volunteers were asked to report within a 5-day period on whether the links worked, the questions were understandable, and the questions reflected the nature of the study (face validity). Additionally, I checked to make sure the online platform and survey design worked properly. The only suggestion received was to make the referral process clearer. In order to do so, the “thank you” email was changed to specifically read “Click here” in order to refer others. There were no adjustments to the items, scales, or tests on the basis of the pilot study.

### **Data Collection**

Data were collected over a period of 3 months (February 2015 –May, 2015). Referral data show that there were four waves, which may have been enough to provide a balanced sample (Kendall et al., 2008). However, the characteristics of the sample remain unknown, and as a result this is not certain. The survey had a moderate abandonment rate; whereas 75 participants began the survey, only 43 actually completed it (completion was measured by response to the HIV testing item). The survey completion rate was 57.3%. The sample size ( $n = 43$ ) was within the guidelines established by a priori power analysis (discussed in chapter 3), though it did not meet the target sample size of  $n = 50$ . There were no significant deviations from the data collection method discussed previously.

### **Internal Consistency of the BFI**

Internal consistency of the BFI was a concern because of the small size and characteristics of the population, which were different from the population in which it was developed. John and Srivastava (1999) provided alpha scores for their reference sample. The same test has been used to score the scales in the current population, as shown in Table 7. This shows that the source study had much higher internal consistency within the scales. This is most likely related to the size of the sample ( $n = 872$ , compared to  $n = 43$  for the present study). Interpretation of Cronbach's alpha is not straightforward, but in general it is assumed that internally consistent scales will meet  $\alpha = 0.6$  (appropriate for exploratory research; Loewenthal, 2001). In this case, the decision was made not to eliminate low-correlating variables for scores that did not meet this threshold (Extraversion and Openness). This decision was made on the basis that these variables had low range, which indicates strong weighting toward a few categories rather than distribution across the range, which is one of the situations in which consistency estimates like Cronbach's alpha can be misleadingly low (Osborne, 2008). However, it should be noted that the BFI scales may not be as internally consistent as would have been desirable in this study.

### **Demographic Profile**

Mean age of the population was 25.52 years. This was not normally distributed, but given the small size of the sample, this is not surprising. There were peaks at 25, 29, and 30 years compared to the other years.

Table 7

*Summary of Cronbach's Alpha Between Current Sample and John and Srivastava (1999)*

Scale	Cronbach's alpha ( $\alpha$ )	
	Current sample	Reference sample (John & Srivastava, 1999)
Extraversion	0.40	0.88
Agreeableness	0.64	0.79
Conscientiousness	0.62	0.82
Neuroticism	0.72	0.84
Openness	0.55	0.81

The majority of participants lived in Tennessee (23 participants). Other states included Georgia (five participants); California, Illinois, Louisiana, and Texas (two participants each); and Alabama, Arkansas, Florida, Kentucky, Maryland, and New Jersey (one participant each). This geographic spread was expected, and given the nature of the population and the recruitment method, it was reasonable, as participants were likely to have friends in other areas and no geographic limitation was placed on the study.

Table 8 summarizes the education level, income, employment status, marital status, and living arrangements of the participants. As the demographic characteristics of this population are not really known, it cannot be directly compared for proportionality. However, some general observations can be made. The education level of participants was relatively high, with 84% having at least some college. Unemployment was also relatively high at 7%, but this is not necessarily indicative of the population because of the small size of the sample. Annual income was moderate, with most participants earning between \$20,000 and \$50,000. Most participants were single. Most rented their residences.

Table 8

*Summary of Frequencies for Key Demographic Risk Factors (N = 43)*

Factor	Category	<i>f</i>	%	Cumulative %
Education level	High school, GED, or equivalent	6	14.0	14.0
	Some college	14	32.6	46.5
	Undergraduate degree	18	41.9	88.4
	Graduate degree	5	11.6	100.0
Employment status	Unemployed	3	7.0	7.0
	Part time (fewer than 35 hours a week)	8	18.6	25.6
	Full time (35 hours a week or more)	32	74.4	100.0
Annual income	Less than \$20,000	6	14.0	14.0
	\$20,000 to \$50,000	33	76.7	90.7
	\$50,001 to \$80,000	4	9.3	100.0
Marital status	Single/Never married	32	74.4	74.4
	Committed relationship/Not married	9	20.9	95.3
	Married	1	2.3	97.7
	Divorced	1	2.3	100.0
Living arrangement	Staying with family or friends	13	30.2	30.2
	Rent current residence	27	62.8	93.0
	Own current residence	3	7.0	100.0

## Results

Results are presented in six sections. First, descriptive statistics for remaining variables are presented. Second, there is a brief discussion of the assumptions of the main method used for testing (binomial logistic regression). The next three sections present the results of hypothesis testing. The final section includes further tests that emerged from the data.

### Descriptive Statistics

Descriptive statistics were partly presented in the previous section, as the demographic risk factors also form the demographic profile of the study. Remaining univariate descriptive statistics include the BFI scales and HIV testing behavior.

Table 9 summarizes the descriptive statistics for BFI scales. All scales used a 5-point Likert scale, which means that the possible range was 4 points, with mean falling between 1.0 and 5.0. Table 9 shows that mean values for BFI scales ranged from Neuroticism ( $M = 2.67$ ) to Agreeableness ( $M = 3.9$ ). The smallest range and standard deviation was seen for Openness, while the largest was shown for Neuroticism.

Normal distribution of the scales was a consideration. Most of the variables (Extraversion, Conscientiousness, Neuroticism, and Openness) are slightly or moderately right-skewed (skewness  $> 0$ ). However, Agreeableness is strongly left-skewed. This shows that none of the variables are symmetrically distributed, though Neuroticism is closest. Kurtosis ranges from -0.77 to 0.31. This indicates a platykurtic distribution, with low likelihood of extreme values and outliers. Figure 6 shows the distribution of the five variables. This does demonstrate that the variables do not generally have a normal

distribution (though they do not clearly have other distributions either). This is likely due to the small size of the sample.

Table 9

*Descriptive Statistics for BFI Scales*

	Range	Min.	Max.	<i>M</i>	<i>SD</i>	Skewness		Kurtosis	
						Stat.	<i>SE</i>	Stat.	<i>SE</i>
Extraversion	2.75	2.25	5.00	3.630	.6786	.232	.361	-.520	.709
Agreeableness	2.44	2.33	4.78	3.899	.5278	-.570	.361	.313	.709
Conscientiousness	2.22	2.56	4.78	3.691	.5513	.195	.361	-.540	.709
Neuroticism	2.88	1.38	4.25	2.666	.7572	.132	.361	-.769	.709
Openness	1.72	2.88	4.60	3.892	.3971	-.422	.361	.092	.709

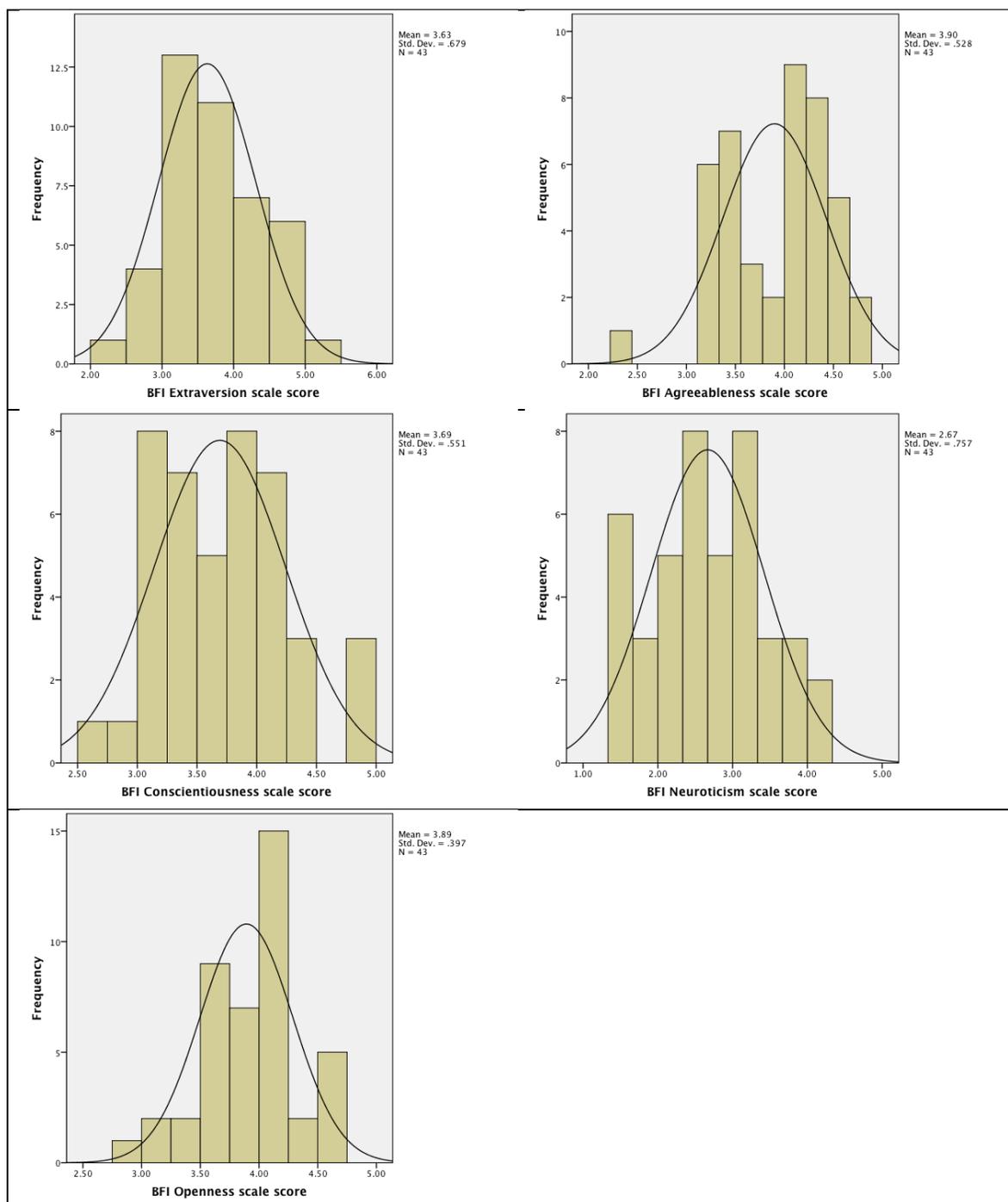


Figure 6. Histograms for BFI scales.

The second descriptive statistics were the HIV test variables. Eighty-six percent of participants had had an HIV test within the past 12 months, while 14% had not. Figure 7 shows the distribution of test sites. This shows that the majority of participants (65.1%) opted for a test conducted by a medical professional, while a smaller group (16.3%) used both in-office and home tests. Only one participant had only an at-home test.

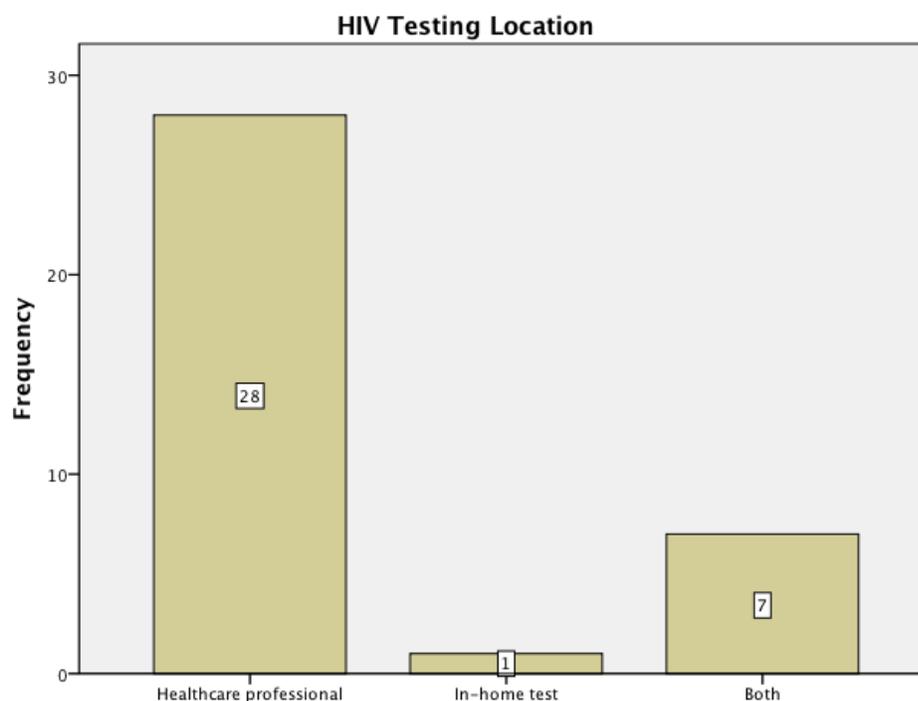


Figure 7. HIV testing location.

### Assumptions of Binomial Logistic Regression

There are four main assumptions of binomial logistic regression (Everitt & Dunn, 2010). These include the following:

1. The dependent variable is a dichotomous variable with mutually exclusive categories;
2. The independent variables are continuous or categorical;

3. Observations are independent; and
4. There is a linear relationship between the logit transformation of the dependent variable and continuous independent variables (Everitt & Dunn, 2010).

The first two assumptions are met through the structure of the data. HIV Testing, the dependent variable, is a mutually exclusive dichotomous variable (yes/no). For Hypothesis 1, continuous variables (BFI scale scores) were used. For Hypothesis 2, categorical social risk factors were used. Hypothesis 3 used both categories.

To test independence, two methods were used. A Fisher's exact test was used to examine the  $2 \times 2$  independence of the independent categorical variables with the HIV testing dependent variable and with each other (Howell, 2012). Table 10 summarizes the outcomes of these tests. The results showed only two significant associations at  $p < .05$ , including Employment Status and Annual Income and Marital Status and Employment Status. The connection between Employment Status and Annual Income is readily explained because income does actually depend on employment.

Independence of continuous variables was tested using correlations. Table 11 summarizes the correlations for all continuous variables (including age and the BFI scales). The significant correlations were between Conscientiousness and Extraversion ( $r = 0.313, p = 0.044$ ), Conscientiousness and Agreeableness ( $r = 0.496, p = 0.001$ ), Neuroticism and Conscientiousness ( $r = -0.346, p = 0.023$ ), and Openness and Extraversion ( $r = 0.449, p = 0.003$ ). These are consistent with known correlations between the scales in the Big Five (Donahue & Kentle, 1991; John & Srivastava, 1999;

John et al., 2008). No BFI scales had a significant correlation with Age. This was considered appropriate for the current test because the age range was restricted.

Table 10

*Summary of Fisher's Exact Test Outcomes*

	1	2	3	4	5
1 Annual income					
2 Education	4.262 (0.629)				
3 Employment status	18.316* (0.000)	7.517 (0.174)			
4 Living arrangement	6.368 (0.109)	9.682 (0.072)	4.561 (0.294)		
5 Marital status	8.103 (0.271)	8.991 (0.476)	12.170* (0.041)	6.806 (0.426)	
6 HIV testing	1.302 (0.585)	3.741 (0.221)	0.343 (1.000)	1.739 (0.466)	2.576 (0.490)

\* $p < .05$ .

Table 11

*Summary of Correlations Between Continuous Variables*

	1	2	3	4	6
Age (1)					
Extraversion (2)	-.039 (0.804)				
Agreeableness (3)	.048 (0.762)	.108 (0.490)			
Conscientiousness (4)	.313* (0.044)	.033 (0.834)	.496* (0.001)		
Neuroticism (5)	-.263 (0.093)	-.059 (0.705)	-.322* (0.035)	-.346* (0.023)	
Openness (6)	.125 (0.432)	.44*9 (0.003)	.184 (0.237)	.231 (0.137)	-.176 (0.260)

\* $p < .05$ .

In order to examine the linear assumption (assumption 4), the natural log of the continuous variables was calculated and included in a test run of each hypothesis, along with the other variables. For all three tests, none of the Box-Tidwell transformed variables were significant. This indicates there is sufficient linearity between the outcome variable and the transformed continuous variables, and the test can move forward (Osborne, 2008).

### **Outlier Detection and Removal**

Finally, continuous variables were tested to ensure there were no outliers or extreme values that should be removed. Outliers were detected using extremes testing, stem and leaf plots and boxplots (visual inspection; Osborne, 2008). No extreme cases were found for Extraversion, Conscientiousness, and Neuroticism.

One extreme case was found for Agreeableness (2.33). However, this was within three standard deviations of the mean and was not eliminated (Osborne, 2008). One extreme case was also found for Openness (2.88). Once again, this was within three standard deviations and was retained. No outliers were removed.

## **Hypothesis 1 Outcome**

### **Research Question 1**

Is there a statistically significant association between the participants' personality traits as measured by the Big Five and having an HIV test within the last 12 months?

H<sub>0</sub>: There will not be a statistically significant association between the participants' personality traits as measured by the Big Five and having an HIV test within the last 12 months.

H<sub>A</sub>: There will be a statistically significant association between the participants' personality traits as measured by the Big Five and having an HIV test within the last 12 months.

This hypothesis was tested using multiple binomial logistic regression, with the Big Five personality factors as the independent variables and HIV Testing as the dependent variable. The model summary for the hypothesis outcome is shown in Table 12, while the table of coefficients is shown in Table 13.

Typically, r-square values in logistic regression are somewhat lower than linear regression (Everitt & Dunn, 2010). However, the regression outcomes are still very low, ranging from 11.3% of variance explained to 20.3% of variance explained depending on the r-squared value. The coefficient table shows that none of the factors are significant at  $p < .05$  based on the outcome of the Wald test. The classification table (table 14) shows an effective prediction rate of 88.4%. The sensitivity of the model was 100% (accurately predicting Yes in all cases), but its specificity was relatively low (only predicting No accurately 16.7% of the time).

There is no indication that there is a statistically significant association between Big Five personality traits and HIV testing within the past 12 months. The alternative hypothesis that there is a statistically significant relationship cannot be accepted and the null hypothesis cannot be rejected.

Table 12

*Model Summary for Hypothesis 1*

Step	-2 log likelihood	Cox & Snell $R^2$	Nagelkerke $R^2$
1	29.616 <sup>a</sup>	.113	.203

<sup>a</sup> Estimation terminated at iteration number 6 because parameter estimates changed by less than .001.

Table 13

*Coefficients for Hypothesis 1*

	B	SE	Wald	df	Sig.	Exp (B)
Extraversion	.184	.772	.057	1	.812	1.202
Agreeableness	-2.217	1.483	2.235	1	.135	.109
Conscientiousness	-.145	1.094	.018	1	.894	.865
Neuroticism	-1.269	.799	2.524	1	.112	.281
Openness	.806	1.811	.198	1	.656	2.238
Constant	11.029	8.370	1.736	1	.188	61620.898

Table 14

*Classification Table for Hypothesis 1*

		Predicted			% correct
		HIV dummy			
	Observed	No	Yes		
Step 1	HIV dummy	No	1	5	16.7
		Yes	0	37	100.0
Overall %					88.4

<sup>a</sup> The cut value is .500.

## Hypothesis 2 Outcome

### Research Question 2

Is there a statistically significant association between the participants' social risk factors as measured by (age, education, employment, housing, income, and marital status) and having an HIV test within the last 12 months?

H<sub>0</sub>: There will not be a statistically significant association between the participants' social risk factors as measured by (age, education, employment, housing, income, and marital status) and having an HIV test within the last 12 months.

H<sub>A</sub>: There will be a statistically significant association between the participants' social risk factors as measured by (age, education, employment, housing, income, and marital status) and having an HIV test within the last 12 months.

This hypothesis was examined using the same technique as Hypothesis 1. It included the social risk factors (age, annual income, education level, employment status, marital status, and living arrangement) as predictor variables, with HIV testing as the outcome variable. Results are shown in Tables 14 (Model summary), 15 (coefficients), and 16 (classification table).

As Table 14 shows, this test is also relatively weak, with predictor variables explaining only 12.2% to 21.7% of the variance. The Wald test outcomes for the included variables (table 15) did not show significance at  $p < .05$  for any of the included variables. The classification table shows an overall predictive accuracy of 85.7%. Once again,

sensitivity is high (100%) but specificity is extremely low (0%). This suggests this model is more effective at predicting that individuals will have HIV tests than that they will not have. However, this is a problematic finding because of the relatively large percentage of the sample that had HIV testing, which may make it difficult to predict a negative result given the small sample size.

Based on this outcome there is no significant relationship between the social risk factors identified and HIV testing behaviors. Once again, the alternative hypothesis cannot be accepted and the null hypothesis cannot be rejected.

Table 6

*Model Summary for Hypothesis 2*

Step	-2 Log likelihood	Cox & Snell $R^2$	Nagelkerke $R^2$
1	29.001 <sup>a</sup>	.122	.217

<sup>a</sup> Estimation terminated at iteration number 20 because maximum iterations has been reached. Final solution cannot be found.

Table 7

*Coefficients for Hypothesis 2*

	<i>B</i>	<i>SE</i>	Wald	<i>df</i>	Sig.	Exp(B)	95% CI for EXP(B)	
							Lower	Upper
Age	-.118	.182	.417	1	.519	.889	.622	1.270
Education dummy	-.697	1.413	.243	1	.622	.498	.031	7.942
Income dummy	-1.166	1.781	.429	1	.513	.312	.009	10.216
Living arrangements dummy	-.102	1.409	.005	1	.942	.903	.057	14.303
Employment dummy	17.512	20094.000	.000	1	.999	40312779.101	.000	
Marital dummy	-19.981	11563.585	.000	1	.999	.000	.000	
Constant	24.620	11563.586	.000	1	.998	49265103471.050		

Table 8

*Classification Table for Hypothesis 2*

	Observed	Predicted			
		HIV dummy		% correct	
		No	Yes		
Step 1	HIV dummy	No	0	6	0.0
		Yes	0	36	100.0
Overall %					85.7

*Note.* The cut value is .500.

### Hypothesis 3 Outcome

#### Research Question 3

Does the relationship between participants' personality traits as measured by the Big Five, and social risk factors as measured by age, education, employment, housing, income, and marital status influence having an HIV test within the last 12 months?

H<sub>0</sub>: The relationship between participants' personality traits as measured by the Big Five and social risk factors as measured by age, education, employment, housing, income, and marital status will not influence having an HIV test within the last 12 months.

H<sub>A</sub>: The relationship between participants' personality traits as measured by the Big Five and social risk factors as measured by age, education, employment, housing, income, and marital status will influence having an HIV test within the last 12 months.

For this process, a hierarchical binomial logistic regression test was used. Big Five factors were entered as the first round of analysis, with social risk factors being entered in the second round. Results are shown in Tables 18, 19, and 20. (These include the final step only.)

The goodness of fit of this model (Table 18) is somewhat better than the previous two, with r-squared values indicating the model predicts 21.4% and 38.3% of the variance in the outcome variable (HIV Testing). The classification table (Table 20) shows an overall percentage accuracy of 85.7%, about the same as the model for Hypothesis 2. Once again, it has a high sensitivity to Yes responses (97.2%), but a low specificity for

No responses (16.7%). The Wald tests for the coefficients (Table 19) once again show that there is no significant relationship between the test variables and the outcomes.

As with Hypothesis 1 and 2, there is no indication that there is a significant relationship between the predictor variables and the outcome variables based on the outcomes of the test. The alternative hypothesis for this test cannot be accepted and the null hypothesis cannot be rejected.

Table 9

*Model Summary for Hypothesis 3*

Step	-2 log likelihood	Cox & Snell $R^2$	Nagelkerke $R^2$
1	24.312 <sup>a</sup>	.214	.383

<sup>a</sup> Estimation terminated at iteration number 20 because maximum iterations has been reached. Final solution cannot be found.

Table 10

*Coefficients for Hypothesis 3*

	<i>B</i>	<i>SE</i>	Wald	<i>df</i>	Sig.	Exp(B)	95% C.I. for EXP(B)	
							Lower	Upper
Extraversion	.613	1.005	.372	1	.542	1.845	.258	13.217
Agreeableness	-2.229	1.500	2.208	1	.137	.108	.006	2.036
Conscientiousness	-.183	1.293	.020	1	.888	.833	.066	10.508
Neuroticism	-1.363	.872	2.442	1	.118	.256	.046	1.414
Openness	.477	2.225	.046	1	.830	1.611	.021	126.260
Age	-.279	.266	1.100	1	.294	.757	.450	1.274
Education Dummy	-.538	1.693	.101	1	.751	.584	.021	16.119
Income Dummy	-.423	2.063	.042	1	.837	.655	.011	37.339
Employment Dummy	16.629	19193.792	.000	1	.999	16676 194.718	.000	
Living Arrangement Dummy	-.267	1.615	.027	1	.869	.766	.032	18.148
Marital Status Dummy	-19.639	10877.558	.000	1	.999	.000	.000	
Constant	37.782	10877.567	.000	1	.997	2562213150 0642520.000		

Table 20

*Classification table for Hypothesis 3*

	Observed	Predicted		
		HIV dummy		% correct
		No	Yes	
HIV dummy	No	1	5	16.7
	Yes	1	35	97.2
Overall %				85.7

<sup>a</sup> The cut value is .500

### Summary

This chapter has included the statistical results of the analysis for the study. The survey results included responses from AAMSM age 18 to 30 ( $n = 43$ ). With the survey I measured the Big Five personality traits (Extraversion, Agreeableness, Conscientiousness, Neuroticism, and Openness) as well as social risk factors (Age, Education Level, Annual Income, Employment Status, Marital Status, and Living Arrangement). The outcome variable for all tests was HIV Testing. I used a binomial regression model in order to test the relationships between these variables. For Hypothesis 1 (Big Five factors) and Hypothesis 2 (social risk factors) binomial logistic regression was used. For Hypothesis 3 (combined Big Five and social risk factors) hierarchical binomial logistic regression was used.

All three of the null hypotheses could not be rejected. None of the Big Five or social risk factors was shown to be significant in any of the tests, either independently or together. Additionally, the model fit for the hypothesis regression models was poor, not reaching above 38.3% (for the combined model). These results may be because of the

small size of the sample, which as the Cronbach's alpha shows may have made the BFI scales inconsistent, or because of the homogeneity of the sample. The results will be discussed and analyzed in the next chapter.

## Chapter 5: Discussion

### **Introduction**

This research was conducted to investigate the influence of demographic and personality factors on HIV testing rates among young AAMSM. Demographic factors, which were derived from Aday's (2001) model of the social determinants of health, included age, education, employment, housing, income, and marital status. Personality traits, which were based upon the Big Five model of personality, included agreeableness, conscientiousness, extraversion, neuroticism, and openness. Statistical analysis of the survey data indicated that neither the demographic variables nor the personality dimensions had statistically significant impacts on HIV testing rates.

### **Interpretation of the Findings**

I found recent testing rates among young AAMSM to be relatively high at 86%, which stands in contrast to the finding of Swenson et al. (2011) that just 52.1% of teens and young adults were willing to take a free HIV test (Swenson et al., 2011). On the other hand, Straub et al. (2011) found that high-risk adolescents were more likely to seek HIV testing (72%) and that MSM were particularly likely to request an HIV test, which is in keeping with the high rates of testing among young AAMSM who participated in the current study. However, I found no statistically significant relationships between any of the demographic factors of interest and the likelihood of seeking HIV testing.

Past findings regarding the influence of education level have been mixed. Johns et al. (2010) found that MSM with high school diplomas were more likely to seek HIV tests than their less-educated counterparts, but Washington et al. (2013) found a negative

relationship between education level and HIV testing. Also, Liddicoat, Losina, Kang, Freedberg, and Walensky (2006) found that older and better educated individuals were more likely to refuse HIV tests. Delpierre et al. (2008), in line with the results of the current study, found that education had no impact on the likelihood that homosexual and bisexual males would delay HIV testing (The Liddicoat et al. study focused on individuals who subsequently received a positive HIV diagnosis; the degree to which testing had been delayed was determined based on CD4 cell count).

Prior researchers have found that younger individuals may be more inclined to avoid testing because conscientiousness typically rises with age (Donnellan & Lucas, 2008; Lehmann et al., 2012; Soto et al., 2011) and is associated with increased perception of risk with regard to dangerous sexual activities (Chauvin et al., 2007). However, I found high rates of testing among young AAMSM, in keeping with the findings of Liddicoat et al. (2006) that younger individuals were less likely to refuse HIV tests. On the other hand, they are at odds with the findings of the aforementioned researchers with regard to education level, given that those in the sample had relatively high average education levels for their age range, yet the majority sought testing. Prior researchers have found that African Americans are more inclined to engage in HIV-related self-protective behaviors than their Caucasian counterparts (Millet et al., 2012), so it is possible that a race effect mitigated a smaller education effect. However, similar research with a multiracial sample would be required to confirm this.

Age was not found to be a statistically significant predictor of HIV testing rates in this study. However, the age range of participants was restricted due to the focus on

young AAMSM, so this finding does not provide any insight into changes in the likelihood of testing that may occur over the lifespan.

I also found that employment status did not influence the likelihood of seeking an HIV test. A search of the literature indicated that there have been no prior studies conducted to explore the impact of employment status on HIV testing rates among young AAMSM, and studies that have examined HIV testing rates in relation to employment status have typically focused on unemployment and yielded mixed findings.

Employment status was identified as a factor in the likelihood of HIV testing among African migrants in the UK by Burns, Imrie, Nazroo, Johnson, and Fenton (2007), as seeking employment took precedence over accessing HIV-related services for the unemployed. However, Jerene, Endale, and Lindtjorn (2007) found that unemployment was associated with increased likelihood that tuberculosis patients in Ethiopia would accept HIV testing. In keeping with the current study, Delpierre et al. (2008) found that employment status (as indicated by membership in one of three categories: employed, receiving unemployment benefits, or inactivity) had no impact on the likelihood that homosexual and bisexual men in France would delay HIV testing.

As for housing status, approximately one-third (30.2%) of the respondents in this study said that they were staying with friends or family, the majority rented their places, a small minority were home owners, and none identified as homeless.

No prior studies on the link between housing status and HIV testing rates among young AAMSM were identified during the literature search, and studies that have been conducted to examine housing status in relation to HIV testing rates in other populations

have typically focused on homelessness. Only one study that incorporated multiple housing status categories was found. Delpierre et al. (2008) examined the degree to which HIV testing was delayed among homosexual and bisexual men and found that accommodation (whether or not respondents had their own places) did not predict test avoidance, which was in keeping with the lack of a statistically significant effect in this study. I also found no statistically significant effects for income. Income effects on HIV testing rates among young AAMSM have not been studied by prior researchers. However, broader populations have been studied, and, as with the other social risk variables, outcomes have been mixed. Millet et al. (2012) and Pisculli et al. (2011) found negative relationships between income and testing, whereas Johns et al. (2010) found a positive relationship. Given that 76.7% of participants in the current study cited incomes of \$20,000 to \$50,000, the sample did not have sufficient representation of either affluent individuals or those below the poverty line in order to draw any firm conclusions. As with the other social risk variables, more research would be required to clarify the relationship between income and the likelihood of seeking HIV testing.

Marital status is another social risk variable that has received little attention from prior researchers studying HIV testing rates. Although no past researchers have examined the influence of marital status on HIV testing among young AAMSM, some insight can be gained from a Ugandan study conducted by Bwambale, Ssali, Byaruhanga, Kalyango, and Karamagi (2008), who found that married men perceived their risk of infection as low and thus were less inclined to seek voluntary HIV counseling and testing. However, the majority of respondents in the current study (74.4%) were single and had never been

married (only one participant identified as married), so the subsample of married individuals was not sufficient to draw any meaningful conclusions.

Although few studies have been conducted to explore the influence of social risk factors on HIV testing rates, there is significant general empirical support for the predictive value of Aday's (2001) model. Age (Murphy et al., 2009); education (Cutler & Lleras-Muney, 2010; Johns et al., 2010; Washington et al., 2013); income, employment, and housing (Ayala et al., 2012; Elkington et al., 2010; Halkitis & Figueroa, 2013; Mustanski et al., 2011); and marital status (Aday, 2001; Bogg & Roberts, 2004) have all been associated with health-related behaviors and outcomes by prior researchers. While it is possible that these factors only influence certain health-related behaviors while having no effect on HIV testing rates, it is also possible that the null results for social determinants are attributable to the relatively small and homogenous sample.

A review of the literature also indicated that few researchers have explored the five-factor personality model in relation to HIV infection, and the small number of studies that were conducted tended to focus on either behaviors that put individuals at risk for infection or health-related behaviors they engage in after receiving an HIV diagnosis. However, given the general findings of various five-factor researchers, one might expect to find certain relationships with HIV testing. Agreeableness has been positively associated with perceived dangers related to risky sexual practices (Hermand & Mullet, 2007), which suggests a possible association between agreeableness and HIV testing. On the other hand, the relationship between conscientiousness and HIV testing was difficult to predict because although this trait is positively associated with health-

protective behaviors (Takahashi et al., 2012) and risk perception in relation to dangerous sexual activities (Chauvin et al., 2007), prior research indicates that it is not associated with HIV testing (Hagger-Johnson & Shickle, 2010). Past studies have associated extraversion with both reduced risk perception in relation to high-risk sexual activities (Chauvin et al., 2007) and increased sexual risk-taking (Schmitt & Shackelford, 2008; Zietsch et al., 2010). Thus, one might expect an association between extraversion and reduced likelihood of HIV testing. Neuroticism has been associated with a heightened desire for HIV testing (Johnson, 2000), so a positive relationship between neuroticism and testing could also be expected, but the sample for this study had high testing rates combined with relatively low neuroticism scores ( $mean = 2.666$ ). Past research has associated openness with increased likelihood of engaging in risky sexual behaviors (Vollrath et al., 1999), but also with greater human capital (Jonassaint et al., 2011), which should have a health-protective effect according to Aday's (2001) model.

Only two prior studies examining the influence of Big Five personality traits on HIV testing rates were identified during the literature review. Johnson (2000) found that neuroticism scores were associated with a desire for HIV testing; however, the other Big Five personality traits showed no statistically significant effects, in keeping with the findings of the current study. In a more recent study that examined the link between conscientiousness and HIV testing, Hagger-Johnson and Shickle (2010) found no statistically significant relationship between conscientiousness scores and the likelihood of seeking an HIV test, also in keeping with the current study. In this case, the researchers suggested that the null result may have been attributable to a negative

relationship between conscientiousness and the likelihood of engaging in risky sexual behaviors (conscientious individuals may perceive themselves as being at low risk for infection and therefore consider testing unnecessary).

Despite the null findings of this research, the predictive value of the Big Five model of personality for a broad spectrum of health-related behaviors and outcomes has substantial empirical support (Bogg & Roberts, 2004; Kern et al., 2009; Lahey, 2009; Young & Beaujean, 2011), as does the link between HIV risk behaviors and Big Five personality traits (Schmitt & Shackelford, 2008; Zietsch et al., 2010). As with the demographic variables, it is unknown whether the null finding with regard to Big Five personality dimensions can be attributed to a true lack of influence or limitations associated with the sample.

### **Limitations of the Study**

This study had a number of limitations that may have influenced the outcome. First, due to limited time and resources, I used a cross-sectional design to conduct this research. Therefore, the findings reflect a single point in time and a single AAMSM cohort, which may have negatively affected the study's validity.

A second weakness of this research was the use of a small, non random sample, which yielded a relatively homogenous study population. Although the sample met the minimum sample size requirements for the tests used according to a priori power analysis conducted with G\*Power, its distribution did not capture certain high-risk groups. For example, there were no participants with lower than a high school education, few non HIV testers ( $n = 6$ ) or unemployed individuals ( $n = 3$ ), and no homeless respondents.

Past researchers have found that social networks tend to be homogeneous with regard to demographic variables such as age, marital status (Kalmijn & Jeroen, 2007), and socioeconomic status (Lewis, Gonzalez, & Kaufman, 2012), as well as attitudes and behaviors (Burk, Steglich, & Snijders, 2007). This homogeneity is attributable to the tendency for people to gravitate toward those who are like them and the fact that behaviors and characteristics often spread throughout social networks (Lewis et al., 2012). Overall, 84% of the participants had some postsecondary education, and annual incomes were moderate, which suggests a middle-class bias. These issues could be attributable to reliance on social networks for recruitment, which may have excluded vulnerable groups. Also, because the sample was recruited via social media, it probably excluded those who did not participate in online communities or tended to be secretive regarding their sexual activities.

A third limitation was the focus on particular social determinants of health and personality factors. Because this research was confined to six of Aday's (2001) personal demographic variables, it did not identify community-level and social interaction variables that may have influenced testing rates. Also, given the focus on Big Five personality traits, the influence of personality traits not associated with the Big Five model may have been overlooked.

The fourth limitation arose from the use of a self-report instrument, which may have introduced bias. However, threats to validity were mitigated by conducting a pretest with expert review, and threats to reliability were addressed by using an established instrument to collect data on personality factors. When assessed with American and

Canadian samples, the BFI yielded Cronbach's alpha scores ranging from .75 to .90 (Johns et al., 2008), indicating that this questionnaire has high reliability.

The fifth limitation of this research was its focus on a specific population, young AAMSM. Because the study was confined to a single demographic group, the findings cannot be generalized to other populations.

### **Recommendations**

To address the limitations of this study, it would be beneficial to conduct a similar study using a larger sample size and a selection method that reduces the risk of bias. Also, future researchers should ensure the inclusion of high-risk groups such as homeless individuals and those living below the poverty line. In addition, given that this research was confined to a particular set of demographic and personality factors, it would be worthwhile to examine HIV testing rates in relation to additional social risk factors and personality traits. Other elements within Aday's (2001) model that are worthy of study in relation to HIV testing rates include community characteristics, social networks, social support, religion, volunteerism, and family structure. Also, although the Big Five model of personality is the most commonly applied model in health research, traits associated with other personality models may predict HIV testing rates. Thus, it would be useful to conduct similar research with a focus on personality traits defined by other models. In addition, prior researchers have found that African Americans are more likely to engage in HIV-related self-protective behaviors (Millet et al., 2012), so it would be worthwhile to recruit a multiracial sample for future research. Incorporating a large, racially diverse sample could help to determine whether race interacts with other social risk factors.

Another area worthy of exploration is the impact of test site availability and accessibility on HIV testing rates. It is possible that test sites were highly accessible for those included in the sample for this research, which could have contributed to the high testing rate. However, no questions about site accessibility were included on the survey, so further research would be required to determine whether accessibility is a factor. Given past research indicating that certain high-risk groups may fail to seek HIV testing due to access barriers (DeBlonde et al., 2010), this variable should be included in future research. Specific access barriers to HIV testing that have been cited by African American men include insufficient service hours, distance, and expense (Petroll et al., 2009).

### **Implications**

The results of this research have a number of implications. First, the null findings for personal demographic factors suggest that individual risk factors based on demographic categories may be less relevant than community-based or socially interactive factors with regard to HIV testing. It is possible that general community characteristics, social support networks, and participation in volunteer and religious organizations are more influential variables with regard to HIV testing rates than personal factors. Thus, future research should examine such contextual factors in order to develop a better understanding of influences on HIV testing rates. Identifying factors associated with community and social contexts could be helpful when developing public health policies and strategies to encourage HIV testing among high-risk groups. Additional research would be beneficial, as the findings could provide the potential to revise

interventionist thinking regarding the design of workable interventions for this emergent high-risk population. The potential for positive social change lies in stemming the tide of HIV among the members of this vulnerable population and in better engaging AAMSM in the medical system to improve their long-term health prospects.

Second, the null findings for Big Five personality dimensions suggest either that personality traits do not influence HIV testing rates among AAMSM or that other personality factors not included within the Big Five model affect testing rates. Although the Big Five model of personality is the most widely applied theoretical model in health studies, the findings of this research suggest that it may not be the best model for predicting HIV testing rates. Therefore, future studies should examine HIV testing rates in relation to other personality traits or models in order to determine whether or not personality plays a role in testing rates.

Third, the null findings of this research, as well as the scarcity of research on this topic overall and the divergent findings of the few studies that have been conducted, indicate a need for further research. To yield meaningful results, future research should be conducted on a larger scale in terms of both sample size and the inclusion of additional variables such as test site accessibility. Also, the failure of the sample recruited for this study to capture the full spectrum of demographic factors indicates a need for future researchers to use recruitment methods that do not rely on social networks.

### **Conclusion**

I sought to identify the demographic and personality factors that influence HIV testing rates among young AAMSM, a group that is at high risk for infection. I found no

statistically significant effects for demographic variables or Big Five personality traits, a finding that is in keeping with some prior research but stands in contrast to the results of other studies. Promoting HIV testing among high-risk groups is an important element in prevention, and therefore a critical aspect of the nation's public health strategy. Given the paucity of research in this area and the mixed findings of the few studies that have been conducted, more research is required to draw any firm conclusions about the effects of personality and demographic factors on the HIV testing rates of young AAMSM. Future research in this area should be prioritized, as the findings could inform strategies for improving HIV testing rates among high-risk groups.

Additional research would be beneficial, as the findings could aid public health practitioners in developing more effective strategies for encouraging HIV testing among young AAMSM. The potential for positive social change lies in slowing the spread of HIV through this vulnerable population and in better engaging young AAMSM in the medical system to improve their long-term health prospects.

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### Appendix A: Pilot Study Form

I appreciate your help in pilot testing the online process for this survey. While I recognize that you do not meet the criteria for the population under consideration, I am grateful for your willingness to help me with this. After completing the questionnaire, please take a moment to provide your feedback to the following:

- a) Are all the links functional? If not, please explain.
- b) Are the questions clear and understandable? If not, please explain.
- c) Do the questions reflect the underlying constructs they are meant to reflect? If not, please explain.

## Appendix B: Consent Form

## CONSENT FORM

You are invited to participate in a research study on the investigation of the social and personality factors that influence human immunodeficiency virus (HIV) testing rates among young African American men who have sex with men (AAMSM). This study is being conducted by Tayo Awopeju, who is a doctoral student at Walden University.

The researcher is inviting African American men who have sex with men (AAMSM), aged 18-30 years old, who currently reside in the United States to be in this study. For the purposes of this research, MSM are male persons that have sexual contact with men regardless of how they identify themselves. This form is part of a process called “informed consent” to allow you to understand this study before deciding whether to take part.

This study will take approximately 10-15 minutes of your time. You will be asked to complete an online questionnaire about your personality, social economic status and HIV testing.

Your decision to participate or decline participation in this study is completely voluntary and you have the right to terminate your participation at any time without penalty. You may skip any questions you do not wish to answer. If you do not wish to complete this questionnaire, just close your browser.

Any information you provide will be completely anonymous. The researcher will not use your personal information for any purposes outside of this research project. Data will be kept secure on an encrypted USB key. Only the researcher will have direct access to the data, while access could be granted to supervisors or examiners for the purpose of analytical verification if required. Data will be kept for a period of at least 5 years, as required by the university.

Although there is no compensation for participation in this research and it may not benefit you personally, it will help contribute important insights regarding factors that make young AAMSM less likely to seek testing, which will be useful for developing more effective strategies to encourage testing among this population.

There are no risks to individuals participating in this survey beyond those that exist in daily life. However, in the event that participants find themselves distressed by the survey or its contents, below are a list of support services and programs in the study area that can be contacted.

American Social Health Association: Sexually Transmitted Disease Hotline 1-800-227-8922

CDC AIDS Info 1-800-232-4636

AIDS Info: Treatment, Prevention and Research 1-800-HIV-0440

You may ask any questions you have now. Or if you have questions later, you may contact the researcher at (405)923-9176 or email [tayo.awopeju@waldenu.edu](mailto:tayo.awopeju@waldenu.edu). If you want to talk privately about your rights as a participant, you can call Dr. Leilani Endicott. She is the Walden University representative who can discuss this with you. Her phone number is 612-312-1210. Walden

University's approval number for this study is **01-09-15-0143375** and it expires on **January 8, 2016.**

Please print a copy of this consent form for your records, if you so desire.

I have read and understand the above consent form, I certify that I am 18 years old or older and, by clicking the submit button to enter the survey, I indicate my willingness to voluntarily take part in the study.

SUBMIT

## Appendix C: Questionnaire

Questionnaire ID Number\_\_\_\_\_

This questionnaire is completely anonymous. The responses cannot be traced back to the respondent, and no one will ever associate your responses with your name. Your participation is completely voluntary and you can withdraw at any time by simply closing the window.

Answer the following questions by checking the most appropriate response that applies to you.

**A). How old are you? \_\_\_\_\_**

**B). What State do you reside in? (Please, choose from the dropdown menu)**

**Click Here  Select your state**

**C). What is the highest education level you have completed?**

- Did not complete high school
- High school graduate, GED, or equivalent
- Some college
- Undergraduate degree
- Graduate degree

**D). What is your annual income?**

- Less than \$20,000
- \$20,000–\$50,000
- \$50,001–\$80,000
- \$80,001–\$120,000
- More than \$120,000

**E). What is your employment status?**

- Full-time (35 hours a week or more)
- Part-time (less than 35 hours a week)
- Unemployed
- Retired

**F). What is your current living arrangement?**

- Own current residence
- Rent current residence
- Staying with family or friends
- No permanent address

**G). What is your marital status?**

- Single/Never married  
 Committed relationship/Not married  
 Married  
 Separated  
 Divorced  
 Widowed

**H). Have you had an HIV test conducted by a healthcare professional or performed a discreet in-home HIV test in the past 12 months?**

- No  
 Yes

If Yes,

- I had an HIV test performed by a healthcare professional  
 I performed an in-home HIV test  
 Both

**How I am in general**

Here are a number of characteristics that may or may not apply to you. For example, do you agree that you are someone who *likes to spend time with others*? Please write a number next to each statement to indicate the extent to which **you agree or disagree with that statement.**

<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>
Disagree Strongly	Disagree a little	Neither agree nor disagree	Agree a little	Agree strongly

**I am someone who...**

1. \_\_\_\_\_ Is talkative
2. \_\_\_\_\_ Tends to find fault with others
3. \_\_\_\_\_ Does a thorough job
4. \_\_\_\_\_ Is depressed, blue
5. \_\_\_\_\_ Is original, comes up with new ideas

6. \_\_\_\_\_ Is reserved
7. \_\_\_\_\_ Is helpful and unselfish with others
8. \_\_\_\_\_ Can be somewhat careless
9. \_\_\_\_\_ Is relaxed, handles stress well.
10. \_\_\_\_\_ Is curious about many different things
11. \_\_\_\_\_ Is full of energy
12. \_\_\_\_\_ Starts quarrels with others
13. \_\_\_\_\_ Is a reliable worker
14. \_\_\_\_\_ Can be tense
15. \_\_\_\_\_ Is ingenious, a deep thinker
16. \_\_\_\_\_ Generates a lot of enthusiasm
17. \_\_\_\_\_ Has a forgiving nature
18. \_\_\_\_\_ Tends to be disorganized
19. \_\_\_\_\_ Worries a lot
20. \_\_\_\_\_ Has an active imagination
21. \_\_\_\_\_ Tends to be quiet

22. \_\_\_\_\_ Is generally trusting
23. \_\_\_\_\_ Tends to be lazy
24. \_\_\_\_\_ Is emotionally stable, not easily upset
25. \_\_\_\_\_ Is inventive
26. \_\_\_\_\_ Has an assertive personality
27. \_\_\_\_\_ Can be cold and aloof
28. \_\_\_\_\_ Perseveres until the task is finished
29. \_\_\_\_\_ Can be moody
30. \_\_\_\_\_ Values artistic, aesthetic experiences
31. \_\_\_\_\_ Is sometimes shy, inhibited
32. \_\_\_\_\_ Is considerate and kind to almost everyone
33. \_\_\_\_\_ Does things efficiently
34. \_\_\_\_\_ Remains calm in tense situations
35. \_\_\_\_\_ Prefers work that is routine
36. \_\_\_\_\_ Is outgoing, sociable
37. \_\_\_\_\_ Is sometimes rude to others
38. \_\_\_\_\_ Makes plans and follows through with them

39. \_\_\_\_\_ Gets nervous easily
40. \_\_\_\_\_ Likes to reflect, play with ideas
41. \_\_\_\_\_ Has few artistic interests
42. \_\_\_\_\_ Likes to cooperate with others
43. \_\_\_\_\_ Is easily distracted
44. \_\_\_\_\_ Is sophisticated in art, music, or literature

**Please submit your questionnaire by clicking the SUBMIT button below.**

**SUBMIT**

## Appendix D: Facebook Post

## Facebook Post



**Are you are an African American male that has sexual contact with men, currently residing in the United States, and are between the ages of 18-30?**

My name is Tayo Awopeju. I am conducting a research study on the social and personality factors that influence Human Immunodeficiency Virus (HIV) testing rates among young African American men who have sex with men.

Participants will be asked to complete an online questionnaire about their personality, social economic status and HIV testing. If you have 10-15 minutes to volunteer to participate in my research study, please [click here](#). Participation is voluntary and anonymous. Thank you so much!

Please, also feel free to share this questionnaire with people in your social networks to help gather this important information.

## Appendix E: Thank You / Referral Letter

**Thank you page/Referral Instructions**

Thank you for your participation in this study. I appreciate your time to help gather information for this research. You may click on the two encrypted URL links below to invite friends and/or family members who may also be interested in participating in this research study. As you know from completing the questionnaire, I did not gather any personally identifying information, and the study participants are completely anonymous to me and everyone else. You are under no obligation to share this information but your cooperation is highly appreciated.

Again, thank you for your time and consideration.

[Click this Encrypted URL Link to Invite Friend #1 to participate in this study.](#)

[Click this Encrypted URL Link to Invite Friend #2 to participate in this study.](#)

Sincerely,

Tayo Awopeju

## Appendix F: Permission to Use Big Five Instrument

### PERMISSION TO USE BIG-FIVE INVENTORY (BFI)

The Big-Five Inventory (BFI) is not under the public domain; however the copy right holder, Oliver P. John gives non-commercial permission for researchers that can be read in Berkeley Personality Lab Web Site (<http://www.ocf.berkeley.edu/~johnlab/bfi.htm>) and read as follows:

I hold the copyright to the BFI and it is not in the public domain per se. However, it is freely available for researchers to use for non-commercial research purposes. Please keep us posted on your finding

John, Oliver P.

## Appendix G: Letter of Permission—Aday

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