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Relationships among Acculturation, Self-positivity Bias, Stigma, and Condom Use in a
Sample of Urban College Students

A dissertation submitted in partial fulfillment of the requirements required for the degree
of Doctor of Philosophy at Virginia Commonwealth University.

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Table of Contents

| | |
|--|-----|
| Acknowledgements..... | ii |
| List of Tables | v |
| List of Figures | vi |
| Abstract..... | vii |
| Statement of the Problem..... | 1 |
| Review of Literature | 6 |
| Theoretical Framework: AIDS Risk Reduction Model (ARRM)..... | 9 |
| Research Utilizing ARRM..... | 13 |
| HIV/AIDS Stigma..... | 19 |
| HIV/AIDS knowledge | 23 |
| Peer Norms..... | 26 |
| Self-positivity Bias..... | 30 |
| Ethnicity/Race, Culture and Acculturation | 33 |
| Acculturation..... | 39 |
| Current Study | 44 |
| Hypotheses | 45 |
| Hypotheses I | 45 |
| Hypothesis II..... | 45 |
| Hypothesis III..... | 46 |
| Hypothesis IV | 46 |
| Method | 47 |

| | |
|---|----|
| Research Design | 47 |
| Procedure | 47 |
| Participants..... | 48 |
| Measures | 50 |
| Demographics | 50 |
| PAN Acculturation Scale..... | 50 |
| AIDS Knowledge and Information..... | 53 |
| Self-positivity Bias..... | 54 |
| AIDS-related Stigma..... | 54 |
| Perceived Risk for HIV/AIDS | 55 |
| Peer Norms..... | 55 |
| Condom Use..... | 55 |
| Data Analysis Plan..... | 56 |
| Results..... | 57 |
| Descriptive Statistics..... | 57 |
| Socio-demographic Influences..... | 59 |
| Correlations Among Predictor Variables..... | 63 |
| Prediction of Condom Use..... | 63 |
| Discussion..... | 70 |
| Self-positivity bias, Perceived Risk and Condom Use | 70 |
| Sexual Knowledge, HIV/AIDS Stigma, and Condom Use..... | 75 |
| Stigma, Acculturation, and Condom Use | 77 |

| | |
|--|-----|
| Perceived Risk and Peer Norms..... | 80 |
| Model Findings Among Demographic Variables in Study..... | 81 |
| Gender Differences | 81 |
| Racial/Ethnic Differences | 84 |
| Current Results and Duncan and Burkholder Results..... | 86 |
| Strengths and Limitations | 87 |
| Implications for Future Research and Prevention Programs | 90 |
| References..... | 95 |
| Appendices..... | 109 |
| A PAN Acculturation Scale..... | 109 |
| B AIDS Knowledge and Information Scale..... | 111 |
| C Self-positivity Bias Scale | 113 |
| D AIDS-related Stigma Scale | 114 |
| E Perceived Risk for HIV/AIDS Scale | 115 |
| F Peer Norms Scale..... | 116 |
| G Risk Behaviors: Sexual Survey..... | 117 |
| H Socio-Demographic Comparison..... | 115 |
| Vita..... | 123 |

List of Tables

| | |
|--|----|
| 1. Demographics | 50 |
| 2. Means and Standard Deviations | 58 |
| 3. Socio-demographic Comparison..... | 59 |

| | |
|--|----|
| 4. Crosstabulation of Acculturation and Study Variables..... | 61 |
| 5. Crosstabulation of Condom Use and Study Variables..... | 62 |
| 6. Correlation Matrix | 63 |

List of Figures

| | |
|---|----|
| 1. AIDS Risk Reduction Model (ARRM)..... | 9 |
| 2. Hypothesized Model | 46 |
| 3. Path Analysis with Ethnicity and Gender and Acculturation as a Moderator | 64 |
| 4. Full Model Path Analysis Results..... | 66 |
| 5. Model of Adjusted Path Analysis | 67 |
| 6. Model of Path Analysis with Ethnicity and Gender | 69 |

Abstract

RELATIONSHIPS AMONG ACCULTURATION, SELF-POSITIVITY BIAS, STIGMA, AND CONDOM USE IN A SAMPLE OF URBAN COLLEGE STUDENTS By Molly Neff, M.S.

A dissertation submitted in partial fulfillment of the requirements for the degree of
Doctor of Philosophy at Virginia Commonwealth University.

Virginia Commonwealth University, 2012

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Despite an increase in interventions targeted at lowering the rate of HIV/AIDS among college students, the rate of HIV/AIDS infections has not decreased. The purpose of this study was to identify factors (i.e., HIV-sexual knowledge, self-positivity bias, peer norms, acculturation, perceived risk of HIV, HIV-related stigma, and condom use) that may affect condom use among college students who live in an area where the prevalence of HIV is relatively high. The current study utilized a sexually active sample (N=397) of diverse college students (predominantly African American and White) in an urban setting to examine the relationships. Path analysis was used to explore hypotheses. Results indicated that students who endorsed higher levels of self-positivity bias were more likely than other students to report not using condoms the last time they had sex and to perceive themselves at less risk of HIV/AIDS infection. In addition, students who reported unsupportive peer norms regarding safe sex practices perceived themselves at a higher risk of HIV/AIDS. With respect to gender differences, females reported more stigma towards individuals with HIV/AIDS than males, and males reported more perceived risk of HIV/AIDS than females. Lastly, African American college students perceived themselves to be at greater risk of contracting HIV/AIDS than other students and minority students endorsed greater stigma towards individuals with HIV/AIDS than White students. Results emphasize the need for college HIV/AIDS interventions to target peer norms and personal bias as well as cultural and gender differences that might impact condom use.

Statement of the Problem

Most college students are sexually active (ACHA, 2010; CDC, 2009, CDC, 2012; Prince and Bernard, 1998) and many engage in sexual risk behaviors that place them at risk of HIV/AIDS (ACHA, 2010; CDC, 2009, CDC, 2012; Duncan, Harrison, Toldson, Malaka, & Sithole, 2005; Prince and Bernard, 1998). Some sexual risk behaviors include not using condoms, being under the influence of drugs or alcohol while having sex, and having more than one partner.

Despite HIV/AIDS prevention efforts (education, free condoms, and promotion of condom use), the rate of HIV continues to rise among young adults, including those in college (Duncan, Harrison, Toldson, Malaka, & Sithole, 2005). Thus, increasing knowledge about transmission and risk of HIV infection, and promoting condom use among young adults are not sufficient solutions to controlling the spread of this disease. Changing young adult engagement in risk behavior is the most effective way of curtailing the HIV epidemic (Catania, Kegeles, & Coates, 1990). Thus, researchers need to develop a better understanding as to why young adults continue to engage in high-risk sexual behaviors even though they are knowledgeable about HIV/AIDS transmission and the protective role of condoms.

Various models have been used to examine the relationships among factors that affect high-risk behaviors in a myriad of groups (e.g., men who have sex with men, heterosexuals, college students, drug injection users). The AIDS Risk Reduction Model (ARRM) (Cantania, Kegeles, & Coates, 1990) is of particular relevance because it allows an examination of relationships among factors and between the three stages of the model (labeling, commitment, behavioral change). In stage one, labeling, people recognize a

problem that places them at risk for HIV infection. Specifically, stage one consists of perceived susceptibility, transmission knowledge, aversive emotions, and social factors. In stage two individuals develop a commitment (i.e., an intention) to change their behavior that is facilitated through constructs such as self-efficacy with condom use. Other stage two factors consist of aversive emotions, social factors, and perceptions of enjoyment and risk reduction. In the last stage, individuals act on their commitment to affect behavior change (i.e., adopting condom use and other safe sex strategies). Stage three also consists of aversive emotions, sexual communication, help-seeking and social factors.

Two studies that have utilized the ARRM model to examine the relationship between HIV/AIDS and risk behavior specifically among college students will be discussed. The original study by Burkholder, Harlow, and Washkwich (1999) provided new insight into the effects of stigma on HIV education and influenced HIV prevention efforts. They surveyed 481 predominantly White, heterosexual college students (18-20 years old) who were sexually active (214 males and 267 females). They found that HIV/AIDS knowledge and awareness, family communication about sex and HIV, and knowing someone with HIV/AIDS were negatively related to sexual-behavior risk (e.g., less vaginal sex without a condom, less anal sex without a condom). Other findings indicated that students who held more stigma about certain groups such as individuals who are gay or who have HIV/AIDS reported less knowledge about HIV/AIDS. The authors hypothesized that students who stigmatized both people with HIV/AIDS and those who are gay were at risk of engaging in high risk sexual behavior because they distanced themselves from learning more about HIV/AIDS, including possibly knowing

someone with the disease. One limitation of the study was that it was conducted in a rural, New England community where there is a possibility that there are more traditional perspectives on sexual behavior and sexuality than in urban college communities. For example, it is unclear if the association between HIV-related stigma, knowledge, and HIV risk behaviors would be found in a sample of urban young adults where the prevalence of HIV/AIDS is much higher or the perceived susceptibility of the disease is greater.

To examine the hypothesis that community context (i.e., prevalence of HIV in a community) may affect stigma, knowledge, and therefore sexual risk behaviors, Duncan, Harrison, Toldson, Malaka, and Sithole (2005) conducted a study with a sample of African American college students from Louisiana and a sample of South African students. These groups were chosen because HIV disproportionately affects South Africans and African Americans. Duncan et al. found that stigmatization was not related to high levels of knowledge of AIDS among African Americans, and thus knowledge of AIDS did not affect young adult condom use during vaginal or anal sex. South Africans were less likely than the college students in Louisiana to stigmatize persons with AIDS that had vaginal and anal sex without condoms. It is possible that Duncan et al. did not find the same results as Burkholder et al. (1999) because the Duncan et al. study took place in a community where the prevalence of HIV among African Americans was high. For example, in 2002, African Americans from the Louisiana area represented 74% of the newly diagnosed African American cases of HIV in the U.S. (Duncan et al.). This high prevalence of HIV within this community could have made this particular sample of African Americans more aware of their risk of HIV infection than other African

American communities, which facilitated knowledge growth about AIDS regardless of the stigma associated with HIV/AIDS. Thus, the applicability of the AARM model to HIV prevention has produced mixed results among college students, highlighting a need for more research to better understand the relations between HIV knowledge, HIV-related stigma, and HIV risk behaviors.

The purpose of the current study was to identify additional AARM factors (i.e., sexual knowledge, self-positivity bias, acculturation, and peer norms) that may affect risk behaviors among college students who live in an area where the prevalence of HIV is relatively high. For example, a student who believes s/he is invincible to contracting HIV/AIDS (i.e., has a high self-positivity bias) may not think s/he is at risk of contracting HIV/AIDS and may not use condoms. However, a student who believes s/he is at risk or that s/he is not invincible to contracting HIV may engage in safer-sex behavior such as using condoms. Numerous studies have demonstrated a positive relationship between self-positivity bias and sexual risk behaviors (Chapin, 2000; Harman, O'Grady, & Wilson, 2007; Pons-Salvador, Díaz, & Guillén-Salazar, 2010; Raghurir & Menon, 1998).

Furthermore, people who are more connected to the culture of the United States may have less stigma towards individuals diagnosed with HIV/AIDS and therefore be more likely to use more condoms. This hypothesis is supported in a study by Darrow, Montanea, and Gladwin (2009) who examined AIDS-related stigma in a sample of African-American, Afro-Caribbean, Haitian, and Hispanic participants (aged 18–39) who live in high AIDS-incidence areas in Florida. Findings indicated that immigrants had higher stigma than U.S. born participants, and increased AIDS-related stigma was associated with never receiving HIV testing, higher perceived risk of HIV, and a failure

to participate in HIV prevention interventions. Finally, unsupportive peer norms for safe sex practices (condom use) may be negatively correlated with perceived HIV/AIDS risk, which results in less condom use. Previous research has demonstrated that peer norms also influence condom use behavior (Auerbach & Beckerman, 2010; Fisher, Fisher, & Rye, 1995; Friedman, & Reid, 2002). In the current study, hypotheses were tested through path analysis. Peer norms, self-positivity bias, and sexual knowledge of HIV/AIDS were examined as independent variables in the model. Stigma and perceived risk were the mediating variables, acculturation was examined as a moderating variable and condom use was the outcome variable.

The current study examined the hypotheses in a sample of college students living in Richmond, Virginia, an area with a high HIV-prevalence rate. The Virginia Department of Health reported there were 2,199 people living with HIV (about 1% of the population) in the City of Richmond in 2008, and a total of 20,838 individuals with HIV living in the state of Virginia. Thus, the City of Richmond has one of the higher rates of HIV-infection across the state. According to the American College Health Association (2010) survey conducted in the spring semester with college students from Virginia Commonwealth University, 78.4% reported having at least one sexual partner (oral sex, anal sex or vaginal sex) within the last 12 months. Among sexually active students, only 43.4% reported *always* using a condom when they had vaginal intercourse in the last thirty. Fifty-eight percent reported having vaginal intercourse within the 30 days prior to the survey. Eighteen percent of college students who drank alcohol reported having unprotected sex as a result of their alcohol consumption in the last 12 months. These statistics illustrate that many college students in this area are sexually active and engage

in sexual risk behaviors that place them at risk for contracting HIV/AIDS. By utilizing the ARRM in the current study with this diverse, sexually active college population, the results contribute to the literature regarding use of this model in this type of population.

The literature review will discuss the ARRM model, the constructs examined in Burkholder et al. (1999) and Duncan et al.'s (2005) studies, and the new constructs, such as sexual knowledge, self-positivity bias, acculturation, and peer norms, examined in the current study.

Review of Literature

College students engage in sexual behaviors that increase their risk of contracting HIV. According to the Centers for Disease Control and Prevention (CDC, 2012) there was an estimated 1,200,000 adults and adolescents living with human immunodeficiency virus (HIV) in the United States at the end of 2009, and one in five are unaware of their infection. The CDC states that increases in the total number of people in the U.S. living with HIV infection in recent years is due to better testing and treatment options, (the annual number of new HIV infections has remained relatively stable). However, they also indicated that new infections continue far too rapidly, with approximately 50,000 Americans becoming infected with HIV each year. In 2009, people infected through high-risk heterosexual contact accounted for 28% of all people living with HIV, and 27% of new HIV infections. Young adults and adolescents are particularly at risk for exposure through heterosexual transmission (CDC, 2009). Thirty nine percent of the new HIV diagnoses in 2009 were among individuals 13 to 29 years of age (CDC, 2012), suggesting that youth and young adults continue to engage in sexual behaviors that place them at risk of contracting HIV.

According to the Youth Risk Behavior Surveillance, 47.4% of all high school students nationwide had ever had sexual intercourse (CDC, 2011). For example, in 2010 63.1% of high school seniors reported ever having had sexual intercourse. Data from the American College Health Association (2012) further showed that 70% of college students reported having sexual intercourse within the last year. Although having sexual intercourse appears normative for many young adults, unfortunately many young adults place themselves at great risk of negative health outcomes associated with sexual activity. For example, of the 70% of sexually active college students in the survey by the American College Health Association (2012), only 18% reported *always* using a condom or other protective barrier when they had vaginal intercourse in the thirty days prior to the survey. In addition, Prince and Bernard (1998) reported that only 10% of college students at a Midwestern commuter campus reported using condoms every time during intercourse. Young adults also put themselves at high risk for contracting HIV by having sex with multiple partners and by using alcohol and/or other drugs before sexual intercourse, which may negatively affect their judgment about safe sexual practices. The American College Health Association reported that 17% of college students had unprotected sex as a result of their drinking alcohol within the last year (2012). In summary, there is a plethora of research that illustrates the need to understand why young adults are not using condoms and how to effectively intervene to help promote their sexual health.

Psychological barriers (e.g. stigma and perceived risk) as well as behavioral barriers (e.g., knowledge and social factors) affect an individual's use of and intention to use condoms. The most effective way to prevent sexually active people from contracting

and transmitting HIV/AIDS is to use condoms (Cates & Stone, 1992; CDC, 2010; Johnson, Hedges, & Diaz, 2002; Pinkerton & Abramsom, 1997; Weller & Davis-Beaty, 2002).

Research indicates that college students have multiple reasons and misperceptions for not using condoms including the belief that birth control pill and oral sex lower the risk of contracting HIV, having sex with only one partner prevents them from being at risk of contracting HIV, the withdrawal method prevents HIV transmission, misconceptions regarding emergency contraception, and false beliefs that their partners are disease free (Crosby & Yarber, 2001; Goodenow, Netherland, & Szalcha, 2002; Nguyen, Liamputtong, & Murphy, 2006). Students also have the false belief that their peers do not use condoms and do not get infected and as a result, they do not need to use condoms either and they are not at risk of contracting HIV/AIDS (peer influence) (Carey, Bosari, Carey, & Maisto, 2006; Grossman et al., 2008; Ross & Bowen, 2010; Ward, Epstein, Caruthers, & Merriwether, 2011). Furthermore, a study conducted by Allman et al. (2009) illustrated the importance of correct condom use and discussed the decrease in attention to proper use. In their study of 2,614 gay and bisexual men, they found that “delayed condom application” (i.e., applying the condom after the initiation of sex) was practiced by more than half of the participants in the past twelve months, and the delay of application of the condom can result in the infection of a partner with HIV/AIDS. Because of the complexity of variables that might influence one’s decision to use a condom, it is important when conducting research to utilize a sophisticated model that encompasses many possible constructs.

Theoretical Framework: AIDS Risk Reduction Model (ARRM)

The ARRM (see Figure 1; Catania, Kegeles, & Coates, 1990) is founded on the premise that an individual must perceive that his or her sexual activity puts him/her at risk for contracting HIV/AIDS. The ARRM provides three stages of change that illustrate why individuals may believe they are susceptible to contracting HIV, but do not actually alter their behavior. The ARRM can facilitate understanding where people are in the change process, thereby allowing prevention researchers to target specific interventions for that stage of behavior change. The ARRM is divided into three stages based on the psychosocial process that take place when individuals attempt to avoid contracting HIV through sexual transmission. The three stages are (1) identification and labeling of one's behavior as risky, (2) making a commitment to enact low-risk behaviors, and (3) behavior change.

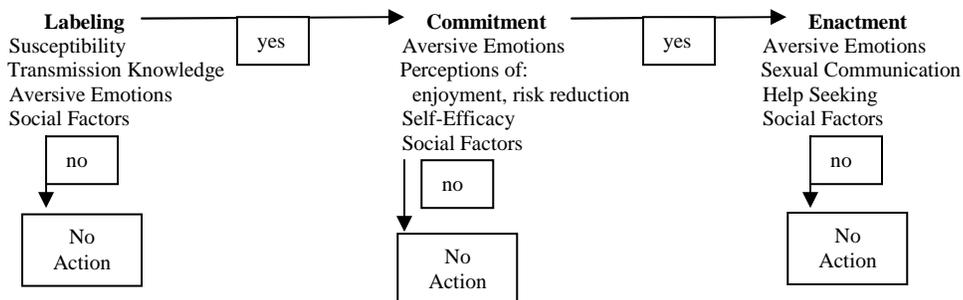


Figure 1. AIDS Risk Reduction Model (ARRM) (Catania, Kegeles, & Coates, 1990).

In stage one, three things must occur in order for people to label their behavior as problematic. Specifically, they must (1) know how HIV is transmitted (i.e., knowledge); (2) believe that they are susceptible to contracting the disease and (3) believe that having HIV is undesirable. Although some individuals may have a high level of knowledge regarding HIV transmission, they may not think they are at risk of contracting HIV because they are not members of a high-risk group so they do not change their risk

behaviors. Social networks may be extremely important in guiding the perception of HIV as undesirable, and therefore certain behaviors as risky. There are other influences that may affect this labeling process, including aversive emotions, social cues, and external motivators. Aversive emotions can be either fear of AIDS or of people who have the virus (stigmatization), or anxiety about infection. Social cues can be peer norms (behaviors entailing reducing risk) or access to health information in one's community. External motivators can include knowing someone who has HIV/AIDS or being exposed to public education campaigns. Once people meet the three aforementioned conditions, theoretically, they will label their behavior as risky (stage one of the ARRM) and thus move to stage two of the model (commitment).

In stage two, individuals have an intention to change their behavior in order to reduce risk of infection. This intention to change is contingent upon how one evaluates the positive and negative outcomes of low- versus high-risk behavior. This examination takes place in three domains: (1) response efficacy (believing that a recommended behavior will be effective), (2) pleasure of high-versus low-risk behavior, and (3) belief in one's ability to perform the behavior change (self-efficacy). Self-efficacy has been shown to be integral to change. Individuals who believe that the adoption of new behaviors will reduce risk must also believe that they can successfully implement this new behavior in order to really change (Cantania et al., 1990). Bandura's self-efficacy theory (Bandura, 1986) provides a foundation for the second stage of ARRM. For example, individuals would be stuck in stage two if they did not believe that they could successfully use condoms during sexual intercourse. This low self-efficacy for condom use would then keep them from moving to the third stage (enacting behavior change).

In the final stage (enactment), individuals initiate change by taking steps towards reducing their risk of infection. This stage is comprised of three phases: (1) information-seeking (gathering ideas about how to change behavior), (2) obtaining remedies (utilizing self-help or friends or professionals), and (3) enacting solutions (including one's sexual partner in changing behaviors).

The ARRM model incorporates constructs from the Health Belief Model (Rosenstock, 1974), efficacy theory (Bandura, 1986), and Theory of Reasoned Action (Fishbein & Ajzen, 1975). Rosenstock (1974) indicates that the beliefs of severity, susceptibility, and efficacy of treatment of the disease, as well as its costs, benefits, and barriers influence a person's motivation to change their behavior. Bandura (1986) states that feelings of self-efficacy of the person participating in the behavior influence behavior change in addition to negative or positive expectations of that behavior. The Theory of Reasoned Action (Fishbein & Ajzen, 1975) states that the best predictor of behavior is behavior intention (i.e., a person's intention to perform or not perform the behavior). Thus, behavior intention is a function of both a person's attitude toward performing the behavior (i.e. the person's predisposition toward the behavior) and subjective norms (i.e., the person's perception of the behavior expected by relevant significant others). Rosenstock (1974) and Fishbein and Ajzen's (1975) contributions to the ARRM are related to all three stages of the model. For example, an individual may believe that changing behavior will not outweigh the cost of changing behavior (even though using a condom could prevent disease it could also be less pleasurable). This variable (from Rosenstock's theory) would pertain to stage two of the model. Whereas the susceptibility variable would be a part of stage one of the ARRM because it is in this stage that

individuals label their behavior as risky.

The ARRM framework is unique in that it integrates multiple health behavior theories that indicate that one must believe that he or she is at risk for contracting a disease in order for change in risky behavior to occur. Once individuals believe they are at risk, they must then commit to making a change. The final stage of the model is taking action to change risky behavior.

Other models that are sometimes used to understand an individual's engagement in risk behaviors include the Information-Motivation-Behavioral skills model (IMB; Fisher & Fisher, 1992) and the Health Belief Model (Becker, 1974; Rosenstock, 1974). The IMB model focuses primarily on knowledge levels and motivation. The IMB model suggests that knowledge of HIV transmission routes and information concerning specific methods of prevention are necessary for behavior change. This concept is present in the ARRM but is further expanded on by highlighting that individuals must believe that they are also at risk of contraction (stage one). Moreover, research demonstrating that college students who have high levels of HIV transmission knowledge still engage in sexual risk behaviors (CDC, 2005; Lewis & Malow, 1997) further supports the notion that knowledge and motivation are not sufficient alone to promote behavior change.

The Health Belief Model (Becker, 1974; Rosenstock, 1974) is another popular model used to study risk behaviors. This model assumes a direct link between perceived risk and behavior and has been criticized in the extant literature because there are many individuals who believe they are at risk of contracting a disease yet they still participate in risky behaviors (Gerard, Gibbons, & Bushman, 1996; Mimiaga, et al., 2010; Ober et al., 2011; O'Sullivan, Udell, Montrose, Antonello, & Hoffman, 2010). The ARRM

indicates that perceived risk is necessary to make behavioral changes, but other variables, such as cost versus benefit and/or severity, can lead a person to continue to participate in risky behaviors, thus never reaching the third stage, changing behavior.

Research Utilizing ARRM

The ARRM has been used as a framework for understanding efforts at reducing the risk of HIV infection in multiple populations such as gay and bisexual men, heterosexuals from different ethnic groups, people attending antibody testing centers, adolescent women attending family planning centers, and drug injection users. Research conducted with student or young adult samples, the population focus of this manuscript, will be reviewed first. In a sample of 481 sexually active heterosexual college students (92% White) attending a predominantly White college on the east coast of the U.S., Burkholder et al. (1999) employed the ARRM framework to understand why the rate of HIV infection among heterosexuals was not decreasing despite an increase in interventions targeting this population. They analyzed the relationships among social stigma, various ways of learning about AIDS (family communication, knowing someone with HIV/AIDS, media influence, passive classroom learning), perceived risk, and sexual risk behavior. They found that heterosexual students who stigmatized people with AIDS/HIV had lower levels of knowledge of HIV/AIDS and engaged in sexual risk behavior (e.g., did not use condoms). They concluded that students might be distancing themselves from educational information related to HIV/AIDS due to stigma associated with the gay community while also participating in high-risk behavior. In addition, condom self-efficacy and perceived risk for HIV/AIDS mediated the relationship between how people learn about HIV/AIDS and sexual risk behavior. Although these

findings are informative, the study was conducted in a rural, New England community where there is a possibility that there are more traditional beliefs and sexual behaviors than in urban college communities. Because it is unclear if the association between stigma, knowledge, and HIV risk behaviors would be found in a sample of young adults where the prevalence of HIV/AIDS is much higher, other researchers replicated the study with young adults in different settings.

The first study to replicate Burkholder et al.'s (1999) was Duncan, Harrison and Toldson et al (2005). They used the same measurements and the ARRM framework to test the same hypotheses, but with two different populations. They surveyed 145 African American college students from Louisiana and 169 South African students. In contrast to Burkholder et al., they found that stigma was positively related to condom use and condom self-efficacy in the African American sample. South Africans held fewer stigma beliefs than the White sample in Burkholder et al.'s study, higher perceived risk of contracting HIV, and higher sexual risk behaviors. Although Burkholder et al.'s study did find that students who had less stigmatization perceived themselves to be at risk, they did not use condoms during anal or vaginal intercourse. These discrepant findings indicate a need to better understand the effects of other factors (e.g., cultural factors, community context) on risk perception, HIV-related stigma, and sexual risk behaviors.

In a study identifying and comparing psychosocial and behavioral factors (can impact all stages of ARRM) associated with STD/AIDS risk among nursing students (N=183 sexually active participants), they found that not using condoms was positively associated with a higher self-positivity bias, more sexual partners, and more consumption of alcoholic beverages. They also found that there were no differences among year in

school and any of the study variables, but the students in their senior year of college were more likely to be in monogamous relationships and therefore used condoms less frequently with their partner (Dessunti & Reis, 2007).

Riley and Baah-Odoom (2010) investigated the spread of HIV/AIDS in a sample of 460 adolescents and young adults (ages 15-28) from Ghana, the authors examined previous researchers' claims that stigmatizing, blaming, and stereotyping attitudes make people feel less at risk of contracting HIV/AIDS (stage one), resulting in more sexual risk behavior. They found that people who reported more HIV/AIDS stigma had less intention to engage in safer sexual behavior (choice of sexual partners and condom use), but actually did engage in safer sexual behavior. Stigma and sexual risk behavior were positively correlated, but this relationship was not mediated by perceived risk. Finally, they found that blaming and stereotyping attitudes were associated with safer intended sexual behavior, and this relationship was mediated by higher perceived risk.

Now the literature review will focus on ARRM studies that utilized samples of populations at higher risk of contracting HIV/AIDS (e.g., drug users). Catania, Coates, and Kegeles (1994) examined a community sub-sample of 716 unmarried adults from the AMEN study (Catania, Coates, Kegeles, et al., 1992). The AMEN study included 1229 participants that consisted of a "household probability sample" characterized by high rates of sexually transmitted diseases and admission to drug programs. The sample included similar portions of Black, White, and Hispanic participants who lived in or near areas with high HIV prevalence rates. Only sexually active people with a risk of HIV infection were included in the study. The results included that adults labeled their sexual behavior as risky (stage one) if they had a sexually transmitted disease (especially genital

herpes) and fewer stereotypic health beliefs. People with secondary partners (not in a primary relationship) had a greater commitment (stage two) to using condoms if they had increased labeling of their behavior as risky, supportive norms towards using condoms, greater enjoyment with condoms, and good sexual communication with partners.

Participants in primary relationships had a greater commitment to condom use if they had high supportive condom norms, greater enjoyment of sex with condoms, or had genital herpes. This study underscores that an important component of HIV prevention is the belief that one is personally susceptible to STD's. According to this study, people believe that once they are in a stable monogamous relationship, their previous belief that they are vulnerable to contracting HIV/AIDS dissipates and as result, they were less likely to use condoms the last time they had sexual intercourse. The results from this study further highlight the need for prevention efforts to focus on perceived risk, barriers to believing one is at risk, and sexual communication and negotiation processes as well as peer norms.

Kowalewski, Longshore, and Anglin (1994) examined psychosocial factors (can impact all stages of ARRM) involved in acquiring safer sex behaviors in a sample of 161 injection drug users who reported having multiple sexual partners in the past year. They tested the first two stages of the ARRM using a measure of perceived risk (stage one) and intention to use condoms during vaginal or anal intercourse in the next year (stage two). They analyzed differences in the predictive value of the ARRM between condom users and non-users. Individuals in both groups who held the belief that he/she was susceptible to AIDS also perceived himself/herself to be at risk of infection. The more educated condom users were, the more they perceived themselves to be at risk of infection. In both groups, greater beliefs concerning condom self-efficacy and having more peers who used

condoms, predicted intentions to use condoms in the future. They also found that greater perceptions of HIV risk infection predicted perceptions that condoms are pleasurable for both groups. The authors also indicated that self-efficacy is related to one's ability to negotiate using condoms with a partner, thus self-efficacy is socially defined and reinforced through their social network and partner. One important implication is that for both condom users and non-condom users, an intention to use condoms in the future is strongly influenced by peer condom use. These findings highlight the need for research to include social factors as well as cultural meaning surrounding risk infection when examining HIV risk behaviors.

In another study with injection drug users, Longshore and Anglin (1995) examined the relationships between Stage 1 (labeling behavior as risky) and 2 (intention to change) of the ARRM in a sample of 392 HIV-negative injection drug users who reported recent sharing of drug paraphernalia. Results indicated that fewer intentions to share drug paraphernalia in the future were directly associated with perceived risk of infection, which in turn was associated with level of HIV knowledge, perceived susceptibility to HIV, and perceived norms about drug-related risk. Both studies illustrate the need to include peer norms as a predictor of risky behavior in future studies.

In a separate study, Brecht, Stein, Evans, Murphy, and Longshore (2009) examined labeling oneself at risk for HIV infection and intention to change HIV sexual and injection risk behaviors among heterosexual methamphetamine-using offenders in drug treatment (i.e., stages 1 and 2 of the AARM). The authors aimed to identify variables related to more condom use, fewer other sexual risk behaviors, and disinfecting needles (all three were combined to form one dependent variable- risk reduction

strategies). Results indicated that perceived self-efficacy was related to increased risk reduction and mediated the relationship between AIDS knowledge and increased risk reduction; furthermore, AIDS knowledge was also directly related to increased risk reduction strategies. Perceived risk was related to increased intentions to use condoms, and males had greater intentions to use condoms than females. Hispanics were less likely to report intentions to use condoms. Prior condom use was positively related to intention to use condoms and prior needle use was indirectly negatively related to intention to disinfect through self-efficacy.

In sum, the ARRM framework is an effective way of examining HIV/AIDS prevention because it incorporates perceived risk of infection as well social factors that can mediate the relationship between perceived risk and risky sexual activity. This is invaluable in understanding people's risky behaviors. Individuals may understand the potential negative effects of contracting HIV/AIDS, but, if they do not believe that they are at risk for the disease, they are less likely to use precaution. Individuals who perceive themselves to be at risk, have knowledge of HIV/AIDS and still do not use condoms when engaging in sexual activity, indicates that there are other barriers such as stigma and social cues (e.g., peer norms, cultural processes) that prevent the use of condoms. Previous ARRM research highlights that perceived self-efficacy, but not intention to change behavior, might be a useful leverage point for AIDS preventive intervention; intentions to share drug injection paraphernalia less often in the future might be influenced directly by drug users' perceived risk of infection. Furthermore, research shows that labeling one's sexual behavior as risky has been associated with having fewer stereotypic health beliefs, greater condom commitment, and high levels of condom use.

Although previous studies using the ARRM have provided important information regarding factors associated with safer sexual behavior, not all ARRM factors have been examined within a college campus. The current study contributes to the literature by examining the role of additional constructs in the ARRM with a sample of college students in an urban setting. In addition to measuring knowledge (sexual transmission of HIV/AIDS) and HIV-related stigma, this study also examined the effects of peer norms, self-positivity bias, and acculturation. Previously studied constructs, as well as new constructs will be discussed in the next section.

HIV/AIDS Stigma

Goffman (1963), who was the pioneer in conceptualizing and creating a framework for looking at stigma, defines a person with stigma as being “reduced in our minds from a whole and usual person to a tainted, discounted one” (p. 3). Furthermore, he indicates that constructs associated with a high degree of stigma are similar in that they all see the individual with the disease as being responsible for having the affliction, the illness is progressive and incurable, the disease is not understood very well in the public, and the resulting symptoms cannot be hidden.

People with HIV/AIDS are heavily stigmatized in the United States (Bogart, et al., 2008; Lee, Kochman, & Sikkema, 2002; Rao, Pryor, Gaddist, & Mayer, 2008; Woltiski, Pals, Kidder, Courtenay-Quirk, & Holtgrave, 2009). About one in four Americans fear direct contact with a person with HIV, and about one in three Americans stated that they would actively evade any physical contact with a person with HIV (Herek, Capitano, & Widaman, 2002).

Stigmatizing attitudes and behaviors can be very damaging and severe to the person who holds the stigmatizing views as well as the stigmatized person. One reason HIV is stigmatized is because of its association with groups that are already ostracized by society (e.g., gay men and drug users) (Herek & Capitano, 1999). Fear of contracting HIV and incorrect knowledge of HIV transmission contribute to stigma. The Center for Disease Control and Prevention (CDC, 2000) reported that forty percent of adults in a probability sample perceived some risk of HIV infection through sneezing, coughing, or drinking from the same glass as an individual infected with HIV/AIDS. Moreover, individuals who were misinformed about routes of HIV transmission were more likely to endorse that people with HIV “got what they deserved” (CDC, 2000).

For individuals with HIV, stigma is a chronic stressor that can cause coping difficulties, poor self-care, problems negotiating safe sex and condom usage (Brincks, Feaster, & Mitrani, 2010; Cowgill, Bogart, Corona, Gery, & Schuster, 2008; Perez; Cruess; Kalichman, Contrada, 2011; Venable, Carey, Blair & Littlewood, 2006). Bogart et al. (2008) utilized semi-structured interviews to explore stigmatization that occurs to families affected by HIV. Multiple family members from thirty-three families in which at least one family member with HIV were interviewed. Results indicated that all of the families experienced some form of stigma: 97% of families described discrimination fears, 79% of families had experienced direct, actual discrimination, and 10% of non-infected family members experienced stigma from association with the HIV infected parent. Fears of infection were associated with interpersonal discrimination. Results support the need for interventions to assist families in coping with stigma and reduce HIV stigma in the general public.

Being stigmatized is associated with negative health outcomes. Vanable, Carey, Blair, and Underwood (2006) explored relationships among stigma-related experiences, medication adherence, disclosure of disease and sexual risk in a sample of 221 individuals with HIV/AIDS. They found that stigma experience is positively correlated with psychological adjustment and adherence difficulties and is more common to individuals who disclose their HIV status. Another study (Woltiski, Pals, Kidder, Courtenay-Quirk, & Holtgrave, 2009) that examined 637 homeless/unstably housed persons living with HIV/AIDS (PLWHA) found that this population experiences many challenges and are particularly vulnerable to HIV-related discrimination. The participants were assessed via computer-assisted interviews on measures of self-assessed physical and mental health, medical utilization, adherence, HIV disclosure, and risk behaviors. Results indicated that higher levels of stigma were experienced by women, homeless participants, participants with a high school education or less, and participants recently diagnosed with HIV. Furthermore, stigma was found to be strongly associated with poorer physical and mental health, and perceived external stigma was associated with lack of adherence to HIV treatment. Perceived external stigma was also associated with decreased HIV disclosure to social group members, and internal stigma was associated with drug use and non-disclosure to sexual partners.

Stigma can also lead to problems with safer sex practices (Clark et al., 2003; Golin et al., 2010; Preston et al., 2004; Zierler, et al., 2000). For example, people who fear being stigmatized will avoid being tested and thus could infect others without knowing it (Eisenmen, Cunningham, Zieler, Nakazono, & Shapiro, 2003). Rosenheck, Ngilangwa, Manongi and Kapiga (2010) surveyed 1,629 women and found that

participants who believed they might have HIV/AIDS also had high stigma towards HIV/AIDS and thus avoid being tested for HIV/AIDS. Individuals, who fear they may have HIV but have not been tested, also due to fear of being stigmatized, may be unable to negotiate condom use because they are afraid their partner might ask about their STD status.

As mentioned earlier in the ARRM literature review section, HIV/AIDS stigma can impact important variables, such as, perceived risk, intention to engage in safer sexual behaviors, HIV/AIDS knowledge, condom self-efficacy (Burkholder, et al., 1999; Duncan, Harrison, & Toldson, 2005; Riley & Baah-Odoom, 2010); all constructs that could lead to risky behaviors (i.e., less condom use). A recent study with a sample of African-American, Afro-Caribbean, Haitian, and Hispanic participants (aged 18–39) residing in high AIDS-incidence areas in Florida examined the prevalence and impact of AIDS-related stigma among these groups (Darrow, Montanea, & Gladwin, 2010). AIDS-related stigma was associated with never receiving HIV testing, higher perceived risk of HIV, and a failure to participate in HIV prevention interventions. Differences among ethnic groups illustrated that Haitians and non-U.S. country of origin participants scored significantly higher on the stigma measure. Puerto Ricans scored lower on the stigma scale, and Mexican participants were more likely to endorse two or more of the 9 stigma items. Furthermore, Black, U.S. born participants were significantly less likely to stigmatize than Black participants from Caribbean nations and Haiti. Lastly, participants who were interviewed in English were less likely to endorse stigmatizing items than those interviewed in their native language (i.e., Spanish or Haitian Creole).

Previous research clearly illustrates the detrimental effects of the relationship

between stigmatization of people HIV/AIDS and sexual risk behavior and that the impact of HIV/AIDS stigma might be distinct in separate populations and cultures. The current study aimed to clarify the relationship between stigma and condom use by analyzing HIV/AIDS stigma as a mediator between HIV/AIDS sexual transmission knowledge and condom use, as well as the relationship among HIV/AIDS stigma and acculturation. Furthermore, previous and more current HIV/AIDS stigma research lacks samples of college students in the United States. Because the statistics of HIV/AIDS infection do not illustrate a decline among U.S. college students, the current research aimed to contribute to better interventions among this population.

HIV/AIDS Knowledge

Although perceiving oneself to be at risk for having health problems such as HIV/AIDS is not sufficient to behavioral change (Gerrard, Gibbons, & Bushman, 1996), it is instrumental in behavioral change. Therefore, it is important to understand the factors that affect risk perceptions. There are five major types of psychological factors that constitute the antecedents of risk in the literature: motivational, cognitive, affective, contextual, and individual differences (Menon, Raghubir, & Agrawal, 2008). In the Burkholder et al. (1999) study, researchers examined knowledge, a cognitive antecedent of health perceptions. There are many different aspects of HIV/AIDS knowledge that can impact one's knowledge of HIV/AIDS. Meaning, non-sexual transmission (i.e., sharing a tooth brush), sexual transmission (i.e., oral sex), as well as specific aspects of HIV/AIDS (i.e., different strains, HIV/AIDS medication), can influence HIV/AIDS knowledge. Another misconception is that people who endorse high levels of HIV transmission knowledge believe that if they have HIV, then behavior change does not matter, when in

fact, there are different strains of the disease and an individual with a lower strain can live a longer life with antiretroviral drugs. If they assume all strains are equal, they may continue to participate in risky behavior and increase their chances of contacting a more severe strain of the virus. People also are confused about what specific sexual acts can allow transmission, for example oral sex versus anal and vaginal sex. All three of these behaviors have differing degrees of transmission risk (Barzargan et al., 2000; Kowalewski, Longshore, & Anglin, 1994).

A significant barrier to preventing transmission and contraction of HIV/AIDS is the inability of individuals to integrate knowledge and behavior. Many studies have shown that although students have a high knowledge level of HIV transmission routes and the usefulness/efficacy of condom use in preventing infection, they continue to engage in high-risk sexual behaviors (Bazargan, Kelly, Stein, Husaini, & Bazargan, 2000; Chng, Carlon, & Toynes, 2006; Duncan, Harrison, & Toldson, 2005; Lewis, Miguez-Burbano & Malow, 2009; Sullivan Udell, & Patel, 2006; Valentine, Wright, & Henley, 2003). For example, Sullivan Udell and Patel (2006) found that even though college students of diverse backgrounds knew that having unprotected sex could lead to contracting STDs such as HIV, they did not use condoms because they did not think they were at risk for contracting the disease. Students in this sample reported that they planned to use protection and put a condom on before intercourse, but failed to follow through. Bazargan, Kelly, Stein, Husaini and Bazargan (2000) found that African American college students were more likely to use condoms if they held high levels of sexual HIV transmission knowledge and positive attitudes towards condoms.

Other studies have found no relationship between knowledge and sexual risk

behaviors. For example, although MacNair-Semands and Simono (1996) found that college students who perceived themselves to be at high risk for contracting HIV were more likely than other students to get tested for HIV, there was no relationship between perceived risk, sexual knowledge regarding HIV transmission, and safer sex practices such as the use of contraception. Gakumo, Moneyham, Enah, and Childs (2012) in their study of high-risk urban women, ages 19-25, also found no relationship between HIV/AIDS knowledge and condom use, but did find that positive attitudes towards condom use and condom negotiation skills predicted more condom use. Findings also indicate that sexual pressure can decrease the likelihood of condom use even when other sexually protective behaviors might be present.

Most studies (e.g., Burkholder, Harlow, & Washwich, 1999; DiIorio, Dudley, & Soet, 1998; Duncan, Harrison, & Toldson, 2005; Opt & Loffredo, 2004) combine sexual and nonsexual routes of transmission into one HIV knowledge score. Yet, combining these two forms of knowledge may result in discrepant findings and may not fully help prevention planners in understanding the relationship between knowledge and sexual health promotion. For example, although 65% of the sample in Bazargan et al. answered sexual transmission knowledge questions correctly, misconceptions still existed. For example, 15% believed that a person having unprotected sex would not be at risk for infection of HIV if the penis were withdrawn before ejaculation. Twenty-eight percent believed that oral sex was safe if the discharge was not swallowed. Furthermore, 48% of the sample believed that having sex with one partner for less than 6 months did not indicate a risk for contraction of HIV. These findings indicate that specific education on transmission through sexual activities is imperative

When HIV knowledge was divided into sexual transmission knowledge and non-sexual transmission knowledge results suggest that higher knowledge of sexual – related transmission routes had a direct effect on condom use, whereas there was no relationship between knowledge of non-sexual HIV transmission routes and condom use (Bazargan, et al., 2000). This may explain why other studies have not found high knowledge of transmission to correlate with safer sex behaviors. Thus, it is important in future research to use a scale that has two factors (nonsexual and sexual knowledge).

In summary, previous research illustrates that HIV-knowledge sometimes correlates positively with condom use, sometimes does not correlate at all, and one study that did divide the HIV knowledge score into two scales, non-sexual and sexual knowledge, found that sexual knowledge had impacted on condom use and non-sexual knowledge did not. The current study utilized the sexual knowledge items from the Bazargan et al. (2000) study in order to elucidate the discrepant findings among previous research. The current study not only examined the relationship between sexual HIV knowledge and condom use, but also included perceived risk as a mediator between sexual knowledge and condom use in order to understand the role of perceived risk in this relationship.

Peer Norms

General peer influences (e.g., peer norms, subjective norms, and peer pressure) are all contextual antecedents that can contribute to the perception of one's risk in terms of health behaviors. These social factors can influence every stage of the ARRM (Cantania, Kegeles & Coates, 1990). Networks and norms are sociocultural factors affecting perceptions of health behavior (Yep, 1993). Social networks and cultural norms

can have an impact on labeling behavior as high risk through disapproval, peer pressure, and social stigmatization. Developmentally, late adolescents depend on peer groups to provide a structure for making decisions (Brown, DiClemente & Reynolds, 1991), thus further indicating a need to focus on peer group norms in intervention strategies with college students (Ratliff-Crain, Donald, & Dalton, 1999). For example, Winslow, Franzini, and Hwang (1992) found in their study of 1,035 students (68% were Caucasian), that knowledge regarding AIDS had no significant correlation with AIDS-risk behavior, however, perceived peer norms did. Fisher, Fisher, and Rye (1995) found that preventative behavior was predicted by behavioral intentions in a sample of 71 heterosexual university students, 19 gay men, and 87 heterosexual high school students. Intentions to engage in almost every AIDS preventative behavior (i.e., abstinence, buying condoms) were a function of both attitudes towards their actions and subjective peer norms. Specifically, in the sample of college students, they found a significant correlation between using a condom and practicing safer sex and behavioral intentions (attitudes and subjective norms). Selvan, Ross, Kapadia, Mathai, and Hira (2009) examined perceived peer group norms, beliefs and intended sexual behavior among a sample of 1,260 higher secondary school students in India (Mean age= 16). The findings illustrated that perceived peer group norms showed significant association with intended sexual behavior and actual sexual behavior.

Because of the plethora of support in the literature that concludes peers are very influential in one's behaviors, there are several studies/interventions that utilized "popular opinion leaders" to disseminate information into the community and alter peer norms and thus behavior change (Kelly, St. Lawrence, Stevenson, et al., 1991). In Kelly

et al.'s study, persons reliably identified as popular opinion leaders were recruited from gay bars and trained in making behavior change endorsements and talking to people who were patrons of these bars. After baseline population assessments were conducted in three cities, one city was chosen for the intervention. Surveys were conducted before and after the intervention with a sample of patrons who had visited the bars with the popular opinion leaders. This innovative approach to educating individuals is a byproduct of the fact that despite knowledge of HIV-transmission, people were still not changing behavior. Results indicated a 16% increase in condom use during anal intercourse and an 18% decrease in men with more than one partner, highlighting the impact of peer leaders in African American communities. In turn, the results of this study helped Kelly et al. (1991) to formulate a standardized method of training POL's which other studies have used.

Not only have popular opinion leaders been effective in the African American community, but they have demonstrated success with Indian participants as well. In a separate study, Sivaram et al. (2004) employed popular opinion leaders to change sexual risk behaviors in 100 different bar and wine shops in India. The researchers developed a community-based randomized controlled prevention trial that focused on testing the effectiveness of preventative HIV messages that are communicated through community popular opinion leaders (CPOLs). The researchers tailored a general HIV education training manual to appropriately address the needs of the patrons. They utilized 16 focus groups and 12 sessions of participant observations. They then piloted the intervention to determine the appropriateness of the training program and its content among wine shop patrons. Results indicated that wine shops were a common meeting place for men and

they were able to recruit CPOLs in these settings and train them to disseminate prevention messages among their peers. The authors concluded that HIV prevention messages were needed to change misconceptions about the transmission methods of HIV, increase self-efficacy of condom use, and focus on how alcohol can effect transmission of HIV.

Stevens, Leybas-Amedia, Bordeau, McMichael, and Nytray (2006) also utilized the POL model to facilitate change. Specifically, the authors focused on substance use and HIV prevention programs while examining the effectiveness of this type of model. They recruited and trained 74 POLs and surveyed 408 students of diverse backgrounds (i.e., African American, White, and Latino). Overall, the results were positive, indicating that this method works in changing behaviors. They found a decrease in binge drinking, and increases in intentions to practice safe sex, self efficacy, and self-esteem.

Other researchers have similarly found an association between peer norms and sexual risk behaviors in samples of individuals living with HIV and individuals who use drugs. Stein, Rotheram-Borus, Swendeman, and Milburn (2005) found that psychosocial factors (e.g., coping style, peer norms, emotional distress, self-esteem and social support) predicted negative behaviors (e.g., delinquency, common drug use and hard drug use), which in turn, predicted high-risk sexual behaviors. Unsupportive (negative) peer norms strongly influenced delinquency and substance use. The researchers concluded that there is a need to focus on peer norms in the design and implementing of sexual risk interventions.

The association between peer norms and sexual risk behaviors has also been found across different cultural groups. A study of 199 Latino college students showed

that individuals who perceived their partner and peers to approve condom use and expressed confidence that they could control themselves in a sexual encounter reported higher levels of intention to use condoms. They also found that Latinos who perceived partner approval and had good impulse control used condoms during sexual intercourse. These results support the need to continue to include peer norms in studies with Latinos and sexual risk behaviors. Furthermore, Liu, Liu, Cai, Rhodes, and Hong (2009) examined the relationship between safe sex and condom use in sample of 351 Chinese men who have sex with men (MSM); the authors found that both descriptive and subjective norms were positively associated with condom use. Thus, the relationship between peer norms and consistent condom use could facilitate the development of culturally competent HIV interventions that focus on promoting safer sex practices.

In sum, previous research clearly illustrates that peer norms influence condom use. This relationship is consistent across many different populations (e.g., MSM), and cultures. Thus, the current study included peer norms in the model in order to better understand relationships between peer norms, perceived risk and condom use in a sample of urban college students. According the ARRM model, one must perceive themselves to be at risk in order to move through the stages of behavior change. Therefore, according to previous research, it seems imperative to include peer norms when trying to understand why students do or do not perceive themselves to be at risk. There is scant extant HIV/AIDS research that utilized the ARRM and included peer norms.

Self-Positivity Bias

People have an optimistic bias for health risk behaviors including HIV. People's self perceptions, a motivational antecedent to health risk perceptions, can be represented

by the “it cannot happen to me” syndrome (Raghubir & Menon, 1998). Literature shows that people assume that others who appear similar to them share their same attitudes and behaviors. This concept is called self-positivity bias or optimistic bias; people tend to believe that bad things are more likely to happen to others (even those they know well) and good things are more likely to happen to them (Weinstein, 1989). Taylor and Brown (1988) posit that this phenomenon is related to maintaining one’s self-esteem. Self-positivity bias can be very harmful in the context of high-risk sexual behaviors and is sometimes referred to as “unrealistic optimism” (Raghubir & Menon).

This phenomenon is particularly common among students; they tend to overestimate other students’ behaviors. Descriptive norms are based on observing another’s behavior. Students tend to overestimate descriptive norms, believing that their peers participate more in risky behaviors than they actually do (Carey, Bosari, Carey, & Maisto, 2006). This tendency results in students believing that because their peers participate in risky sexual behaviors and do not become infected, they will not become infected either if they engage in risky sexual behaviors themselves (i.e., self-positivity bias). Chapin (2000) had 180 middle school-aged children rate the chances of themselves and three other target variables contracting HIV. The author found that optimistic bias was endorsed by 89% of the sample. Research illustrates the link between self-positivity bias and sexual risk behaviors such as not using condoms or not getting tested for HIV. Pons-Salvador, Díaz, and Guillén-Salazar (2010) in their study of 292 college students above the age of twenty, found that unrealistic optimism prevented condom use, and Harman, O’Grady, and Wilson (2007) found support for the hypothesis that college students do not use statistical objective risk information in their assessments of HIV risk.

In another study, Ross and Bowen, 2010, utilized dating vignettes to examine the impact of self-positivity bias and downward social comparison on college students (n=180) sexual decisions (engage in intercourse and use a condom). Students predicted a lower chance of sexual intercourse and more likely to use condoms when the vignette was presented from a second perspective. Results suggest that they believe their own behavior is safe.

In addition, another study examined cognitive strategies that influence one's decision to use condoms in a sample of 63 young adults (O'Sullivan, Udell, Montrose, Antonello, & Hoffman, 2010). The authors found that participants primarily viewed condoms as a way to prevent pregnancy, not sexually transmitted diseases. Analyses of the mental processes revealed that biased evidence evaluation (self-positivity bias) was an explanation for lack of condom use, as well as endorsement of poor alternatives, focus on spurious justifications, dismissing risk, and ignoring risk.

Research illustrates that interventions that incorporate the concept of optimistic bias, can change behaviors. For example, Raguhibir and Menon conducted three studies (N=28, N=76, and N=109) with college students in order to examine the effects of self-positivity bias in the judgments of the risk of contracting HIV/AIDS. They found that when programs increase the perceived similarity of individuals to themselves and when one can more easily access a cause of AIDS from memory, the simulated exercise can reduce self-positivity bias and increase favorable attitudes and intentions toward practicing precautionary behaviors.

In summary, previous research identifies optimistic bias as a positive correlate of risky sexual behavior, particularly among students. Research also indicates that

interventions that can target this construct, can initiate behavior change. If more research can indicate and identify the existence of self-positivity bias in college students, intervention programs at universities will know how to focus prevention efforts. Thus, when an individual reduces this bias, they will have a more realistic view of their vulnerability to contracting HIV/AIDS. The current study included self-positivity and provides support in facilitating interventions targeted at reducing this bias with the ultimate goal of greater condom use.

Ethnicity/Race, Culture and Acculturation

In the context of healthy sexual behaviors, ethnicity, race, culture and acculturation are all interconnected and vital in understanding how to intervene with specific populations. Thus, the next two sections are dedicated to discussing distinct health behaviors and acculturation among different ethnicities.

Research illustrates that racial/ethnic groups differ in high-risk behaviors that could lead to HIV infection (Barry, Weinstock, & Petry, 2008; Goh, 1993). Knowledge and attitudes that influence HIV and risk behaviors have been thoroughly examined in the extant literature and have found interesting differences among distinct groups (Albarracin, Albarracin, & Durantini, 2007; Gadon, Chierici, & Rios, 2001; Oshi, Nakalema, & Oshi, 2005; Wilson & Miller, 2003). For example, Goh (1993) explored levels of knowledge and attitudes between Whites, African American, Latinos, and Asians. The study consisted of 274 participants with an average age of 22 years all attending a university. Results indicated that ethnic groups did not show the same pattern of usage of HIV/AIDS information, and did not have the same scores on the attitudes and knowledge scales. For example, the White, Black and Hispanic groups were more likely

to identify themselves as knowledgeable and having more access to HIV/AIDS information than the Asian American or non-U.S.-born Asian groups. Although Asian-American students demonstrated equal levels of knowledge of HIV/AIDS compared to Whites, Blacks, and Hispanics, their HIV/AIDS-related attitudes were more similar to non-U.S. born Asians, indicating the possibility that cultural factors as well as acculturation may influence their attitudes towards AIDS. Research needs to address what cultural processes may affect this disparity.

A similar study found similar differences among these groups regarding HIV knowledge and condom use. In a sample of 1,611 White, African American, and Asian American college students, DiIorio, Dudley and Soet (1998) found that participants had a high level of understanding of HIV, but Asian American students were more vulnerable to have misperceptions about HIV transmission (e.g., believing AIDS can be transmitted through a mosquito, having oral sex without a barrier is safe, and that using a lambskin condom is safe). Other race/ethnic differences in sexual risk behaviors included that African Americans reported a significantly greater likelihood of having more than one partner in the last year than Whites and Asians combined yet Asians and Whites who drank alcohol were more likely to have more than one partner than African Americans who drank alcohol. In addition, condom use was more consistent among African Americans and Asians than Whites. Both of these studies utilized a college population and found differences among these groups. Both studies also illustrated that Asian Americans and non-U.S. born Asian groups differed from the other groups being analyzed. One study speculated that it is possible that the Asian Americans are less knowledgeable because the AIDS epidemic has not had the same impact on their group as

it has on other groups (e.g., African Americans, MSM). It is possible that this notion also impacted the results of Goh's study; students were less personally familiar with HIV epidemic and might hold stigmatizing attitudes and beliefs towards people with HIV/AIDS.

Furthermore, another, more recent study (Smith, 2003) that examined participants wanting partner to use a condom, but partner not using a condom (*unwanted, non-condom use*), found differences among ethnic groups. Specifically, they found that African Americans and Latinos had more of these experiences and postulated that this could be a result of cultural norms about sexuality and their minority status in the United States. It has been postulated that there is a tendency for African American men to react in anger during condom negotiation because of personal role (e.g., the man is offended because he thinks the woman believes he is unclean), relational role (e.g., if a woman asks a man to use a condom it is a sign of mistrust) and/or social role (e.g., if a woman asserts her desire to use a condom, it shifts the power from male to female) (Collins, 2006). Minorities tend to have a disadvantaged status in society that can limit access to high quality healthcare and preventative care services (Smith, 2003). This indicates the need for research to examine if cultural norms about sex and gender role attitudes are influencing their behaviors. All three of the aforementioned studies examined between ethnic group differences and found support for interventions targeting these populations differently.

In addition to looking at differences among ethnic groups, it is also important to look at possible differences within groups. A study by Villanueva, Darrow, Uribe, Sanchez-Brana, Obiaja, and Gladwin (2010) highlighted the heterogeneity within the

Black race and how this heterogeneity was differentially associated with sexual risk behaviors. Black participants (n=2,731) were comprised of African Americans, Caribbean Islanders, English-speaking Haitians, and Creole speaking Haitians. The researchers found that Creole-speaking Haitians were least likely to consider themselves at risk of HIV infection, English-speaking Haitians were more likely than African Americans to report never engaging in sexual intercourse and were less likely to get tested for HIV, English-speaking Caribbean Islanders and African Americans reported similar preventative behaviors, but Caribbean Islanders had lower perceptions of HIV risk and were less likely to have ever been tested.

A study by Knipper, Rhodes, Lindstrom, et al. (2007) underscores the need for HIV prevention in the emergent Latino community in the southeastern United States. They found in their study of 222 Latino males that greater condom use was associated with males who asked family members about health care, had greater knowledge of HIV transmission and prevention, had greater condom use self efficacy, and had greater adherence to traditional masculine norms. These findings indicated the need to include a family piece in interventions that target the Latino populations, regardless of age.

Another recent study by Gurman and Borzeski (2004) examined within group differences among a sample of 1,821 Latinos (using the NCHA 2002 data set). The findings illustrated that less than half of the participants had used condoms during their last oral, vaginal or anal sexual experience. Individuals participating in oral sex and using condoms was associated with them having taken an HIV test. Both males and females who had anal sex also reported using condoms. Individuals who were 18-24 years old

reported condom usage as well. These findings support the notion that interventions also need to address kinds of sexual activities and specific prevention methods associated. Both of these within group studies highlight the need for interventions to look within groups when planning interventions targeted at decreasing risky sexual behaviors.

Other studies have examined how risky sexual behaviors and ethnicities differ among drug addicted populations. Barry, Weinstock, and Petry (2008) aimed to identify ethnic differences in HIV risk behaviors among cocaine using women receiving methadone maintenance for opioid dependence, and to evaluate the efficacy of contingency management (CM) for cocaine use disorders in reducing HIV risk behaviors. The sample included 47 African, 47 Hispanic, and 29 White women who were randomly assigned to standard methadone treatment or standard methadone treatment plus a CM intervention. They completed surveys the month before baseline and in the 3 months following clinical trial participation. The results at follow-up indicated that White women reported significantly higher lifetime rates of risky drug use and sexual behaviors than African American women. African American women reported fewer high-risk drug use behaviors than White or Hispanic women. Hispanic women reported more high-risk sexual behaviors than White or African American participants. CM did not affect high-risk sexual behaviors. White women receiving methadone maintenance engage in more lifetime HIV risk behaviors than African American women. Contrary to statistics (see next paragraph) regarding HIV/AIDS infection rates within the African American population, this study indicates that when drugs are involved, White women might be at more risk of infection. Because drug use can be highly prevalent among the college population, it is important to keep the results of this study in mind when looking at ethnic

differences. Future studies should include a measure of drug use and interventions should separate drug abusive/addicted individuals when planning treatments.

Because of the plethora of research that illustrates that Latinos and African Americans are high risk groups, the next two paragraphs will report statistics within each group in order to garner support for not only the previously mentioned results, but for future studies to continue looking into what factors need to be addressed when planning HIV prevention interventions.

African Americans are currently the most at risk race regarding HIV/AIDS. The CDC indicated in their statistics based on 33 states, that although African Americans only make up 13% of the population, they accounted for almost 50% of the estimated numbers of HIV/AIDS cases in 2006 (CDC, 2008). Of the estimated 18,849 people under the age of 25 who were diagnosed between 2001 and 2004, 61% were African American (CDC, 2006). The primary transmission category for African American males is MSM which is followed by injection drug use and lastly, high-risk heterosexual contact (CDC, 2005). The primary mode of transmission for African American females is high-risk heterosexual contact followed by injection drug use (CDC, 2007). HIV/AIDS continues to be the leading cause of death of African American males between the ages of 25 and 44, as well as the third leading cause of death for African American females of the same age group (Bazargan, Kelly, Stein et al., 2000). African American college students engage in sexually risky behavior and perceive themselves as at little to no risk (Payne, Beckwith, Davis et al, 2006). This could mean that another factor, like self-positivity bias, is preventing them from believing they are not at risk behaviors and future research needs to examine other hypotheses.

Not only are African Americans over represented in HIV and AIDS cases, Latinos are as well (CDC, 2008; Karon, Fleming, Steketee, & De Cock, 2003). Latinos have the second highest rate of AIDS diagnoses of all racial/ethnic groups (CDC, 2005). In 2004, Latinos accounted for 14% of the total U.S. population and 20% of the total new number of AIDS cases, which was four times as high as the new AIDS cases for non-Latino Whites (CDC, 2005).

In sum, the aforementioned studies and statistics illustrate discrepancies between and within ethnic groups. Clearly ethnic groups have distinct cultural messages, beliefs and attitudes about sexual health. However, when minority groups interact with the dominant culture, what happens? How does integrating, or not integrating, adapting or not adapting to the mainstream American culture impact these cultural methods, attitudes and beliefs, and does this alter behaviors? The literature review will now examine how adopting American culture might impact one's cultural script and consequently one's sexual behavior.

Acculturation. Previous research highlights that cultural scripts impact the knowledge and attitudes that influence HIV risk behaviors (Wilson & Miller, 2003). In relation to HIV prevention, culture has been defined in the literature as “the way of life among members of a group, including the values, beliefs, norms, and traditions that might influence some people to put themselves at risk for HIV transmission” (Wilson & Miller, p. 185). Within racial/ethnic groups, a cultural process that may be related to health risk behaviors is acculturation.

Culture is maintained and can change as individuals interact and communicate within one's ecological system. For example, a person might be a part of more than one

culture/system, such as at school and at home. Acculturation is a process of culture learning that changes the nature of beliefs and values that an individual holds (Marin & Gamba, 1996). Because culture plays a significant role in health behavior (Landrine & Klonoff, 2001), and acculturation levels assist researchers in understanding what values and beliefs individuals subscribe to (country of origin or host culture), acculturation was measured in the current study. Due to the proliferate diversity which typifies this country, there has been prodigious research regarding the concept of acculturation (Chung, Kim, & Abreu, 2004). People acculturate in different ways and at different rates. Not only do different cultures adapt distinctly, but within these separate cultures, individuals will assimilate differently as well (Dana, 1998).

Some individuals will move to a new country and adapt the dominant culture's behaviors and beliefs while simultaneously dropping their native beliefs, referred to as one-dimensional acculturation (Szapocznik, Kurtines, and Fernandez 1980). Others will adopt and be aware of the dominant culture's characteristics and at the same time will adhere to the native customs and beliefs. A bicultural person "has had extensive socialization and life experiences in two or more cultures and participates actively in these cultures" (Ramirez, 1984, p.82). Regardless of how a person integrates two cultures into their beliefs and attitudes, research indicates that behaviors are affected. Furthermore, studies illustrate that there is a significant relationship between generational status and acculturation; typically, first generation individuals are less acculturated. For example, 2nd and 3rd generation Latinos are at higher risk for contracting STD's because it is usually at this point that they let go of some of their previously health beliefs and begin drinking alcohol and taking drugs, which impacts their decision making and

increases their sexual risk behavior (Myers & Rodriguez, 2002).

Previous research underscores the effect that one's culture can have on HIV risk behaviors (Albarracin, Albarracin, & Durantini, 2007; Barry, Weinstock, & Petry, 2008; Galdon, Chierici, & Rios, 2001; Landrine & Klonoff, 2001; Villanueva, Darrow, Uribe, Sanchez-Brana, Obiaja, & Gladwin, 2010; Wilson & Miller, 2003). Research that has examined the relationships among sexual risk behaviors in minority groups among different as well as within the same cultures has shown distinct outcomes and many authors suggest that acculturation is the cause of these mixed results (Blake, Ledsky, Goodenow, & O'Donnell, 2001; Ebin, Sneed, Morisky, Rotheram-Borus, Magnusson, & Malotte, 2001; Guilamo-Ramos, Jacard, Pena, & Goldberg, 2005). Therefore, when looking at previous studies it is difficult to make a general statement about the relationship between cultural messages, attitudes or beliefs and condom use among Latinos and African Americans.

The discussion that follows examines results of extant findings regarding acculturation and sexual risk behaviors. A meta-analysis was conducted in order to understand the relationship between acculturation and sexual health among Latino youth (Afable-Munsuz & Brindis, 2006). Articles included in the analysis ranged from 1985 to 2006 and eligible studies had a sample of males, females or both aged 25 or younger, and included Latino-specific analyses. Seventeen studies were approved for the analyses, and these studies used 23 distinct measures of acculturation that captured four domains, including time (duration of exposure to U.S. culture), language, culture and residence. The authors found a positive association between the likelihood of sexual initiation and acculturation. Furthermore, acculturation also was associated with increased condom use

and with beliefs and norms related to healthy outcomes. However, the authors state that the result between condom use and acculturation is less conclusive. Another limitation to these conclusions is that within the 17 studies, there were 23 different measures of acculturation.

A more recent study that examined acculturation and condom use found that higher acculturation levels (measured by speaking English at home and place of birth) indicated less condom use, although result is not significant (Hahm, 2010). The author utilized data collected from 1996-2001 from the National Longitudinal Study of Adolescent health. Participants were Latina adolescent in transition to adulthood. Overall, findings suggest that Latinas who spoke English at home (native / non-native US) were significantly associated with greater sexual risk outcomes when compared to the lowest acculturated Latinas. A higher level of acculturation, as measured by English speaking at home, predicts sexual risk behavior.

In addition, it is important to understand how not being born in the United States can impact healthy behaviors. Shedlin, Decena, and Oliver-Velez (2005) studied acculturation and HIV risk behaviors in an exploratory approach using qualitative data from 86 Latino immigrants. Results suggest the need for tailoring interventions according to acculturation levels. Authors stated that exposure to new American culture affects HIV risk and prevention and that maintaining some connections to country of origin has both positive and negative risks.

The previous studies have shown support that acculturation can impact risky behaviors. Interestingly, the following study of college students suggests that acculturation levels are not relevant among college students because this population

adapts to the mainstream culture at similar rates due to the campus milieu. Schwartz, et al., (2011) in their study of 3,251 first- and second-generation college immigrant students (White, Black, Hispanic, East Asian, South Asian) examined acculturation and ethnic identity in relation to alcohol and drug use, risky sexual behavior (i.e., unprotected sex), and driving under the influence of drugs/alcohol. The authors used a bidimensional model of acculturation (which included both heritage and U.S. practices, values, and identifications). The authors discussed the immigrant paradox, which illustrates that previous research that highlights the positive association between acculturation and risky behavior is unclear. Is it the loss of one's own culture or the adaptation of U.S. culture that is associated with riskier behaviors? They hypothesize that acculturation is more complex and that research needs to look at two aspects: (1) how much an individual retains of their heritage culture and (2) how much an individual adapts U.S. culture. Results indicate that heritage and collectivistic values were mostly protective against health risk behaviors. However, it is important to note that acculturation affected risk behaviors differently across ethnic groups. For example, the authors found a negative relationship between U.S. identity and impaired driving for Black participants (i.e. U.S. identity was protective), a positive relationship between U.S. cultural practices and sexual risk taking for East Asians, a positive relationship between U.S. identity and hazardous alcohol use for East Asians, and a positive relationship between individualist values and hazardous alcohol use for South Asians. Non-U.S. cultural identifications were positively associated with sexual risk taking for Hispanics; U.S. practices, values, and identifications were not consistently related to risk behavior participation. Furthermore, both first- and second-generation immigrant students engaged in health risk behaviors at similar rates; the

authors believe that this indicates that college students, regardless of generational status, adapt to U.S. culture at the same rate due to the college environment. Due to the lack of associations found with U.S. culture acquisition and the result that at least one domain of heritage-culture retention was protective against risky behavior for all groups, the authors conclude that adaptation to U.S. culture does not always result in higher risky behavior, rather a loss of one's own culture is what results in higher risk behavior. Results illustrate a need to further explore how maintaining non-U.S. cultural values, beliefs and practices impact condom use among different cultures. The current study utilized a bidimensional model of acculturation as well, which enabled participants to be categorized as bi-cultural, and not on a continuum. This is important because it considers if individuals retain country of origin influences.

The aforementioned studies illustrate the need for research to understand how acculturation impacts cultural groups, but also how different messages are received by different groups and within the same groups. Meaning, why does one individual become more acculturated and engage in less risky behaviors whereas another individual becomes more acculturated and engages in more risky behaviors? The acculturation measure utilized in the current study allows researchers to understand how individuals see themselves in terms of cultural influences and how these influences impact condom use.

Current Study

The current study strives to understand the discrepant findings between the studies by Burkholder and Duncan by examining other constructs in the ARRM that influence sexual practices as well as using different measures. Neither Burkholder et al. (1999) nor Duncan et al. (2005) examined peer norms/peer overestimation (a

motivational factor related to stage one of the ARRM), self-positivity bias, or acculturation. Because each study looked at different ethnic groups, acculturation could provide insight into the distinct findings among the two studies. Examining a phenomenon such as optimistic bias, that is highly prevalent among college students, may also help understand the different results of the two studies. It is important to consider these variables because of the need to understand why people continue to not use condoms so that interventions can become more effective. Furthermore, although previous studies have examined the relationship between peer norms, self-positivity bias, and condom use, this study contributes to the literature because it includes all of the aforementioned variables and examines them collectively, whereas other studies have explored only one or two of these variables with sexual risk behavior.

Hypotheses

Hypothesis I. There will be a significant relationship between self-positivity bias and condom use. Specifically, self positivity bias will be associated with less condom use. It is also hypothesized that this relationship will be mediated by perceived risk for HIV. Specifically, as self-positivity bias increases, perceived risk for HIV/AIDS decreases, and as a result, condom use decreases.

Hypothesis II. There will be a significant relationship between knowledge about HIV transmission through sexual activities and condom use. As knowledge about HIV transmission through sexual activities increases, condom use increases. This relationship will be mediated by stigmatization of persons with HIV/AIDS. As knowledge about HIV transmission through sexual activities increases, stigmatization of persons with HIV/AIDS decreases, and as a result, condom use increases.

Hypothesis III. There will be a significant relationship between stigmatization of persons with HIV/AIDS and condom use. This relationship will be moderated by acculturation. Stigmatization of persons with HIV/AIDS will depend on level of acculturation.

Hypothesis IV. There will be a significant relationship between unsupportive peer norms and condom use. As unsupportive peer norms towards safe sex increase, condom use decreases. This relationship will be mediated by perceived risk for HIV/AIDS. As unsupportive peer norms increase, perceived risk for HIV/AIDS decreases. As perceived risk for HIV/AIDS decreases, condom use decreases.

The hypothesized interrelationships among sexual knowledge, acculturation, peer norms and self-positivity bias, stigma and perceived risk, and sexual risk behavior are shown in Figure 2.

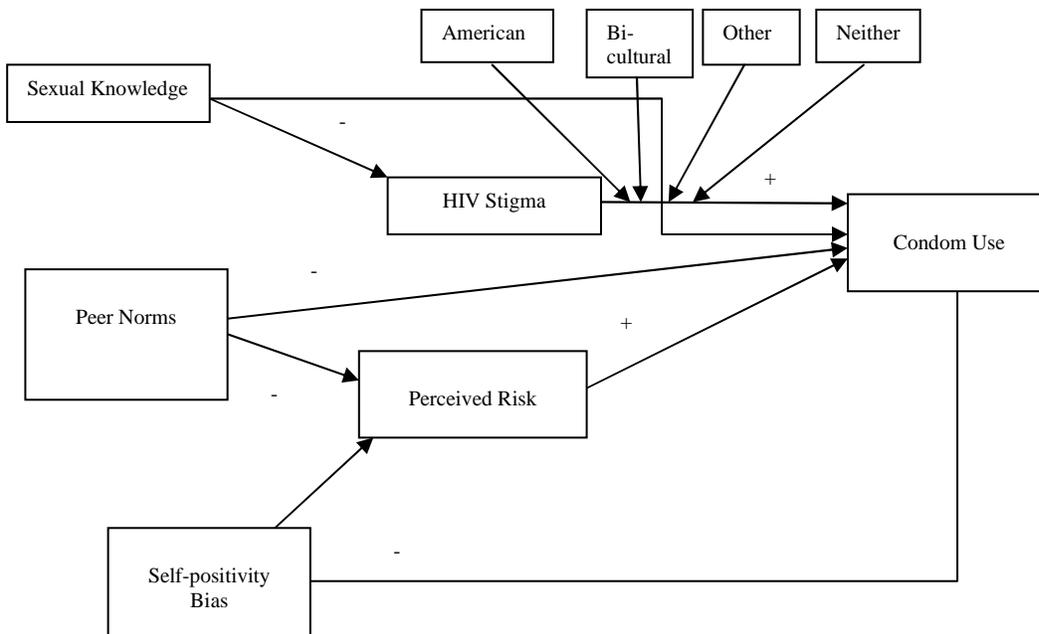


Figure 2. Hypothesized model of path analysis.

Method

Research Design

This study utilized a cross-sectional design to examine the relationships among stigmatization of people with AIDS, sexual knowledge of HIV/AIDS, acculturation, peer norms, self-positivity bias, and condom use. Data was collected at one time point via online surveys. Data was collected over two semesters during the 2009-2010 academic year, N= 590 (n=298 for fall semester and n=292 for spring semester).

Procedure

To be eligible for participation, students had to be enrolled at Virginia Commonwealth University. Students were recruited from Psychology 101 classes. No participant was excluded based on race, ethnicity, gender, or sexual orientation. Eligible students were informed of the study during their class time by a researcher or the professor. The online survey tool, SONA, is a secure interface for the scheduling, maintenance, and administration of psychological research in the Department of Psychology at Virginia Commonwealth University (VCU). Students choose to participate in the SONA research pool because they are required to participate in a certain number of research projects to fulfill class requirements. Prior to consenting to participate, students read the following statement: “All of your data will be kept strictly confidential and will be viewed by the study personnel only. You do not have to answer any question that you do not wish to answer, and you may withdraw anytime from the study without penalty”. Participants read a consent form on the SONA website that explained the procedures of the study and their rights. Participants indicated consent by agreeing to participate in the study prior to completing the survey.

Surveys could be completed on any computer with an internet connection via SONA. Students logged into a secure website with an ID and password. There they were provided with opportunity to read the IRB-approved study descriptions and eligibility criteria, email the project coordinators to ask questions about the studies, and sign up to participate in studies and complete the online questionnaires. The system generated a random unique ID number for each participant. Data was not linked to participant identity, but credit hours were granted to the correct student. At the end of the semester, the participant pool coordinator gave each class instructor a list of the research credit hours each student in his/her class earned from participating in research studies. The instructor had no other information about the research participation of their students. Students received one research credit for their participation in this study.

Approximate time to complete survey was fifty minutes. The principal investigator and research coordinators were responsible for data and safety monitoring during the study. Contact information was provided via SONA in the case that participants needed additional information about the study. The data were transferred from SONA into SPSS and Mplus for data analysis. Survey data were stored with no personal, participant identifiers in order to maintain the nature of this study as anonymous and confidential.

Participants

The original number of completed surveys amounted to 590. Data from participants who completed the online survey in less than 30 minutes, one standard deviation below the mean time completed, ($N = 49$), were excluded from analyses. In this study, the average time it took to complete the survey was 53.07 minutes ($SD=21.06$). An

additional 66 participants were excluded because of age-related issues. Specifically, 49 participants did not provide their date of birth, five were 17 years-old when they completed the survey, and 12 were over 26 years old. Because the main outcome measure in the study focused on condom use, participants who reported never having had sexual intercourse were also excluded (N=67). In addition, 11 cases (2% of sample) were omitted due to having negative scores on the Self-Positivity Bias measure. The aforementioned exclusions brought the total number of participants included in the analyses to 397. Outliers were not removed prior to analyses. There is great debate in the literature about whether outliers should be removed or not. Orr, Sackett, and DuBois, (1991) argued that data becomes more representative of the population when an outlier is not removed. In their study, which is highly cited in the literature, they found that outlying data points were not found to be a substantial source of variance in a large test validity data set. Because the current study's path model included categorical variables (i.e., African American, White, acculturation, condom use), the estimator method used was WLSMV - weighted least square parameter estimates using a diagonal weight matrix with standard errors and a mean and variance adjusted chi-square test statistic that uses a full weight matrix. This method allowed all data, including missing cases, to be used in the analyses and if predictor variables had missing data, *Mplus* excluded them from the analyses. (*Mplus* excludes predictors with missing variables when there is a categorical outcome variable). Listwise deletion is the most common approach for handling missing data, and it often works well, but one should be aware of its limitations if using it (e.g., reducing sample size). Furthermore, data transformations can alter the fundamental nature of the data, such as changing the measurement scale from interval or ratio to

ordinal, and creating curvilinear relationships, complicating interpretation. A common strategy, particularly if the missing data are not too numerous, is to substitute some sort of plausible guess [imputation] for the missing data, such as using the mean. However, according to Allison (2002), all of these imputation methods suffer from a fundamental problem: analyzing imputed data as though it were complete data produces standard errors that are underestimated and test statistics that are overestimated. Conventional analytic techniques do not adjust for the fact that the imputation process involves uncertainty about the missing values. In addition, imputation is fairly easy when only one variable has missing data; however, it can become more complicated in the more typical case, including the current study, when several variables have missing data.

College students in this sample were mostly female (70%) and in their first year of college (63%). Participant’s mean age was 19.28 years (SD= 1.54). The majority of participants were White (62%) followed by African American (19%). Table 1 presents the full demographic characteristics of the sample.

Table 1.

| <i>Sample characteristics.</i> | | % | N |
|--------------------------------|------------------|------|-----|
| Gender | Male | 29.6 | 115 |
| | Female | 70.4 | 274 |
| Race/Ethnicity | White | 61.9 | 239 |
| | African American | 18.9 | 73 |
| | Asian | 9.6 | 37 |
| | Hispanic | 3.4 | 13 |
| | Native American | 0.3 | 1 |
| | Other | 6.0 | 23 |
| Year in School | Freshmen | 62.6 | 243 |
| | Sophomore | 18.3 | 71 |

| | | | |
|-----------------------|----------------------------|------|-----|
| | Junior | 12.4 | 48 |
| | Senior | 5.7 | 22 |
| | Other | 1.0 | 4 |
| Marital Status | Single, never been married | 94.8 | 367 |
| | Married | 1.8 | 7 |
| | Living as married | 1.8 | 7 |
| | Divorced | 0.3 | 1 |
| | Other | 1.3 | 5 |
| Relationship Status | Yes | 60.9 | 235 |
| | No | 39.1 | 151 |
| Religious Affiliation | Protestant or Other | 46.8 | 181 |
| | Christian | 20.4 | 79 |
| | Catholic | 1.3 | 5 |
| | Jewish | 1.3 | 5 |
| | Buddhist | 1.3 | 5 |
| | Hindu | 2.8 | 11 |
| | Muslim | 18.9 | 73 |
| | No religious background | 7.0 | 28 |
| | Other | | |

Measures

Demographics. Participants completed several items to assess demographics including year in college, birth date, gender, race/ethnicity, religious affiliation, and relationship status.

Pan-Acculturation Scale (PAN; Soriano 1999). (*Appendix A*). The PAN was used to identify where participants fall in terms of how much American culture influences them and how much their culture of origin influences them. This scale was developed in order to assess acculturation across minority and non-minority cultural groups. It includes 23 items for which respondents compare various subject domains to their self-identified cultural group and to American culture. In developing the measure, the authors examined existing acculturation measures for content and structure to identify the subject domains to include in this scale. Based on this examination, six subject domains were included in the PAN: language, identity, social support, cultural practices,

generational status and background, and cultural values and beliefs (Ho, Soriano, Yeh, McCabe, & Hough, unpublished manuscript). Respondents selected one of four response options (American culture, their culture of origin, both cultures, or neither culture) for each item.

The PAN has two subscales, American Cultural Affinity and Traditional Cultural Affinity. The American Cultural Affinity subscale is calculated by summing the number of times the participant responded by marking the response American Culture. One's affinity towards one's other culture is measured by summing the number of times the participant responded by marking the response Other Culture. Internal reliability for both subscales was found to be good in a sample of 295 adult Latina women. The American Cultural Affinity subscale had a coefficient alpha of .93 and the Traditional Cultural Affinity subscale had a coefficient alpha of .87. Further, correlations between these two subscales and the Short Acculturation Scale (Ho, Soriano, Yeh, McCabe, & Hough, unpublished manuscript) fell in the predicted directions, indicated good convergent validity.

Four typologies can be derived from the PAN: (1) American Oriented, (2) Other Non-American Culture Oriented, (3) Bicultural (oriented in both about equally), and (4) Marginalized (oriented in neither). The following are the operational definitions: An *American Oriented* person is one who responded American Culture to over fifty percent of the valid responses on the American Orientation Sub-Scale; *Other Non-American* culturally oriented person is one who responded Other Culture to over fifty percent of the valid responses on the Other Culture Orientation Sub-Scale; a *biculturally* oriented individual is one who met the orientation criteria for both American orientation and for

non-American cultural orientation. That is, they marked American Culture and Other Culture to over fifty percent of the valid non-missing items on both the American and the Other Culture Sub-Scales; a *marginalized* person is one who is oriented towards neither American nor towards their Other-Culture. That is, they failed to mark American Culture or Other Culture to over fifty percent of the valid non-missing items on both the American and the Other Culture Sub-Scales. Participants in the current study were classified into the four acculturation categories: (1) American Oriented, 40%; (2) Other Non-American Culture Oriented, 6%; (3) Bicultural (oriented in both about equally), 50% and (4) Marginalized (oriented in neither), 4%.

AIDS Knowledge and Information. (*Appendix B*). Knowledge concerning methods of HIV transmission was measured utilizing a modified version of Fisher et al.'s 35-item scale (1994). Bazargan et al. (2000) utilized 27 items in their HIV study with college students. With a sample of 253 sexually active African American college students, Bazargan et al. conducted a factor analysis that resulted in two subscales (sexual and non-sexual means of transmission of HIV) that had an intercorrelation of .48. Ten items measure specific knowledge about HIV transmission through sexual activities whereas seventeen items measure general knowledge about HIV transmission through non-sexual activities. This measure has a reported reliability, as assessed by Cronbach's alpha, ranging from .75-.80 (Fisher et al., 1994).

For the current study, only the sexual knowledge items were used in order to understand the relationship between sexual HIV-knowledge and condom use. Each question is either True or False, with correct answers coded as one point and incorrect answers coded as zero points. Higher scores indicate more correct knowledge about how

HIV/AIDS is transmitted sexually. An example of an item is, “A person can get HIV when using birth control pills while having sexual intercourse.” For the current sample, the Cronbach’s alpha, was .79.

Self-positivity Bias. (*Appendix C*). Self-positivity Bias is a measure of how people tend to believe that bad things are more likely to happen to others (including people they know well) and good things are more likely to happen to them (Weinstein, 1989). This construct was measured using Raghurir and Menon’s (1998) format, in which participants were asked to estimate risk of contracting HIV/AIDS on a scale from 0-100 (*not at all/very probable*) for four targets: themselves, their best friend, the average undergraduate, and the average person in the country. In the current study, self-positivity bias was calculated by subtracting the self rating from the risk of the average undergraduate. Higher scores indicate more self-positivity bias – that is that the average undergraduate’s risk of getting HIV/AIDS is higher than the participant’s own risk. This strategy is a common and widely used method of measuring self-positivity bias (Helweg-Larsen & Sheppard, 2001).

AIDS-Related Stigma Scale. (*Appendix D*). AIDS-related stigma was measured using Kalichman et al.’s (2005) nine-item scale. Each question is rated 1 (Agree) or 2 (Disagree). All items with the exception of number four were reverse scored so that higher scores indicate more AIDS-related stigma. A sample item is, “People who have AIDS should be ashamed.” Research conducted in five South African communities ($N = 2306$) demonstrated that the scale was internally consistent, $\alpha = 0.75$ and stable over 3 months, $r = 0.67$. The scale was also reported to be reliable in three different languages (English, Xhosa, and Afrikaans). Correlations illustrated that the scale was moderately

inversely correlated with years of education and AIDS knowledge. Furthermore, individuals who stated that persons with HIV should conceal their HIV status had higher AIDS-Related Stigma Scale scores. For the current sample, Cronbach's alpha was .68.

Perceived Risk for HIV/AIDS. (*Appendix E*). Participants' perceived risk of contracting HIV/AIDS was measured using Burkholder and Harlow's (1996) 7-item scale. Each question on the Perceived Risk for HIV/AIDS scale is rated on a 5-point Likert scale of: not at all sure, a little sure, kind of sure, fairly sure, and very sure. Items five and six were reverse scored and scores were summed so that higher scores indicate more perceived risk. An example item is: "I have had sex with someone who could have given me AIDS." In prior work, this measure has a reported Cronbach's alpha of .83 (Burkholder & Harlow, 1996). For the current sample, Cronbach's alpha was .67.

Peer Norms. (*Appendix F*). Peer Norms regarding sexual behavior were measured using Winslow, Franzini, and Hwang's (1992) 10-item scale, which consists of two subscales: perceived attitudes or behaviors of friends (5 items) and general group norms (5 items). Each question was rated on a 5-point Likert response scale of: strongly agree, agree, neutral, disagree, and strongly disagree. Sample items include "Monogamous relationships are no fun" (general group norms); and "My friends don't think safe sex is important" (perceived attitudes or behaviors of friends). For each participant, the items were summed and the higher scores indicate unsupportive peer attitudes towards safe sex. For the current sample, Cronbach's alpha, was .67.

Condom Use (*Appendix G, #18*). Condom use was measured using the following item: "The last time you had sexual intercourse, what method(s) did you or your partner use to protect yourself from a sexually transmitted disease, such as HIV?" Participants

were allowed to check all that applied from a list of 8 responses: “I have never had sexual intercourse”, “no method was used for protection”, “birth control pills”, “condoms”, “Depo-Provera (injectable birth control)”, “withdrawal”, “some other method”, or “not sure”. All participants who checked the response, “I have never had sexual intercourse” were omitted from the study (N=78). The condom use measure was dichotomized such that participants who checked “condoms” (including participants who reported condom use and another form of protection) were assigned a value of 1 and those who checked other responses were assigned a value of 0.

Data Analysis Plan

Data analysis was conducted using *Mplus* that provides advanced statistical analyses that are able to analyze data with missing variables or outliers, and compensates for multicollinearity, and normality without prior adjustment or deletions to the original data set. Loss of important data that sometimes results from data cleaning prior to analyses is prevented. First, Pearson correlation coefficients were estimated to describe the degrees of associations among the variables of interest. Figure 2 (p.47) shows the path analytical mediation model (MacKinnon, 2008) that tested the hypothesized mediation effect of AIDS stigma and perceived risk on condom use. Standardized coefficients (β) for all paths were estimated. To illustrate that the data fit the hypothesized model, the goodness of fit of models was assessed by a non-significant chi square value, the root mean square error of approximation (RMSEA) ≤ 0.06 (a value that is less than or equal to .06 is needed for a good fit), Tucker Lewis Index (TLI) ≥ 0.99 (a value of greater than or equal to .99 is desired for a good fit), and comparative fit index (CFI) ≥ 0.95 (a value greater than or equal to .95 is needed to show a good fit) (Bryan, Schmiede, & Broaddus,

2007; Hu & Bentler, 1999).

The chi-square is a test of the null hypothesis and in the case of path analysis means the model fits the data- *the goal is to be able to accept the null hypothesis* (a non-significant value is desired for chi square). The most common recommendations are a minimum of 200 subjects because a model estimated with a sample size under 200 cases will almost always result in a non-significant chi-square result (Boomsma, 1982; Marsh, Balla & McDonald, 1988). Inclusion of the Root Mean Square Error of Approximation (RMSEA; Steiger & Lind, 1980) and the Comparative Fit Index (CFI; Bentler, 1989) are acceptable additions in assessing the goodness of fit (less sensitive to large sample size and thus provide a less biased measure of model fit) (Marsh, Balla, & McDonald, 1988). The RMSEA requires a value close to .06, or lower, and the CFI requires a value close to .95 or higher for a good fit. Furthermore, it is also important to look at the magnitude and significance of each model path, as well as the proportion of variance (i.e., a standardized coefficient) accounted for in each endogenous variable accounted for by the set exogenous variables. This is because at times, the model will show a good fit (as represented by chi-square, RMSEA and CFI), but model relationships are not strong or meaningful. These paths will illustrate what the model means theoretically and conceptually (Bryan, Schmiede, & Broaddus, 2007). Once a good fit is found, the path coefficients are analyzed to investigate what the model is showing.

Results

Descriptive Statistics

The means and standard deviations for all independent and mediator variables are presented in Table 2.

Table 2.

Means and standard deviations for all continuous predictor variables

| Scale | Mean | SD | N | Range of Scores |
|-----------------------------|-------------|-----------|----------|--|
| AIDS Related Stigma | 10.36 | 1.56 | 365 | 9-18(lower=less stigma) |
| HIV Sexual Knowledge | 6.32 | 1.60 | 397 | 0-10 (higher=more knowledge) |
| Peer Norms | 24.43 | 5.77 | 370 | 10-50 (higher=unsupportive attitudes towards safe sex) |
| Self-Positivity Bias | 27.45 | 21.41 | 370 | 0-100 (higher=more self-positivity bias) |
| Perceived Risk | 12.71 | 4.75 | 373 | 7-35 (higher=more perceived risk) |

N ranged from 356- to 397 due to missing data

Overall, the college students in this sample did not report high levels of HIV-related stigma towards people who have AIDS, answered more than half of the HIV knowledge questions correctly, reported supportive peer attitudes towards safe sex, reported that they were not at risk of contracting a HIV/AIDS and estimated their peers (the average undergraduate) as having a higher risk, thus resulting in high optimistic bias scores. Because the standard deviation was high for self-positivity bias, other descriptive statistics are important to note; *Median*=25; *Mode*=50. The mean score for the item on the Self-Positivity Bias Scale for rating of self was $M=13.49$, and $M=41.14$ for the average undergraduate. There were seven students who estimated their risk as very probable (100), thirty-three students who chose 50 and 159 students who estimated their risk as not at all (0), indicating that although the majority of students reported a high level of self-positivity bias, there were varied responses. There were twelve students who estimated the average undergraduate's risk as very probable (100), 109 students estimated the average undergraduate's risk as 50 and four students who estimated the average

undergraduate’s risk as not at all (0), illustrating the differences in rating self vs. average undergraduate’s risk of contracting HIV/AIDS.

With respect to condom use, forty-two percent of participants reported not using a condom and 58% reported using a condom (alone or in combination with other methods of protection) the last time they had sexual intercourse.

Socio-demographic Influences

MANOVAS were conducted to determine whether there were differences in the variables of interest based on participant gender, race/ethnicity (White compared to minority, and African American compared to all other races/ethnicities), romantic relationship status, and semester (see Table 3). Table 3 depicts the significant findings; refer to Appendix H for all findings. Chi-square analyses were conducted to explore differences between the acculturation categories and the study variables (see Table 4), as well as between condom use and study variables (see Table 5).

Table 3.

Socio-demographic comparison

Semester

| | <u>Fall</u> | | <u>Spring</u> | | <i>F</i> | <i>d</i> |
|----------------------|-------------|-----------|---------------|-----------|----------|----------|
| | <i>M</i> | <i>SD</i> | <i>M</i> | <i>SD</i> | | |
| Sexual Knowledge | 5.85 | 1.40 | 7.03 | 1.54 | 44.53 | .000 |
| Self-positivity Bias | 28.03 | 20.55 | 22.72 | 20.20 | 4.81 | .029 |

Gender

| | <u>Male</u> | | <u>Female</u> | | <i>F</i> | <i>d</i> |
|----------------------|-------------|-----------|---------------|-----------|----------|----------|
| | <i>M</i> | <i>SD</i> | <i>M</i> | <i>SD</i> | | |
| HIV/AIDS Stigma | 10.75 | 1.93 | 10.13 | 1.30 | 9.30 | .003 |
| Peer Norms | 26.64 | 5.06 | 23.86 | 5.76 | 13.88 | .000 |
| Self-positivity Bias | 20.38 | 20.12 | 27.59 | 20.57 | 6.92 | .009 |

Race/Ethnicity

| | <u>Other</u> | | <u>White</u> | | <i>F</i> | <i>d</i> |
|------------|--------------|-----------|--------------|-----------|----------|----------|
| | <i>M</i> | <i>SD</i> | <i>M</i> | <i>SD</i> | | |
| Peer Norms | 23.64 | 5.56 | 25.33 | 5.66 | 5.54 | .019 |

| Race/Ethnicity | <u>Other</u> | | <u>African American</u> | | <i>F</i> | <i>d</i> |
|-----------------------|--------------|-----------|-------------------------|-----------|----------|----------|
| | <i>M</i> | <i>SD</i> | <i>M</i> | <i>SD</i> | | |
| Peer Norms | 25.15 | 5.67 | 22.71 | 5.28 | 7.10 | .008 |
| Perceived Risk | 12.54 | 4.39 | 14.82 | 5.65 | 9.20 | .003 |

| Romantic Relationship | <u>Yes</u> | | <u>No</u> | | <i>F</i> | <i>d</i> |
|------------------------------|------------|-----------|-----------|-----------|----------|----------|
| | <i>M</i> | <i>SD</i> | <i>M</i> | <i>SD</i> | | |
| Peer Norms | 24.03 | 5.68 | 25.82 | 5.68 | 6.11 | .014 |
| Perceived Risk | 11.97 | 4.22 | 14.66 | 5.08 | 21.78 | .000 |

Participants who completed the survey in the fall semester were more likely than those who completed the survey in the spring semester to score lower on the sexual knowledge scale and have more self-positivity bias. Gender differences were illustrated by males endorsing more HIV/AIDS stigma, having more unsupportive peer norms towards safe sex, and less self-positivity bias than females. Results indicated that White participants showed more unsupportive peer norms towards safe sex than minorities. African Americans indicated less unsupportive peer norms towards safe sex and more perceived risk of HIV/AIDS than individuals who identified with another race/ethnicity. Individuals who reported they were in a romantic relationship had more peer norms supporting safe sexual practices, had less perceived HIV/AIDS risk than individuals who indicated not being in a relationship.

Table 4.

Crosstabulation of Acculturation and Study Variables

| <u>Acculturation</u> | | | | | | |
|-----------------------|-------------|--------------|-------------|---------------|----------|--------|
| Race/Ethnicity | <i>Amr.</i> | <i>Other</i> | <i>Both</i> | <i>Neith.</i> | χ^2 | Φ |
| Other | 22 | 13 | 101 | 2 | 71.73 | .000 |
| White | 119 | 5 | 71 | 12 | | |
| Race/Ethnicity | | | | | | |
| Other | 129 | 11 | 121 | 14 | 28.83 | .000 |
| African American | 12 | 7 | 51 | 0 | | |
| Condom Use | | | | | | |
| No | 72 | 4 | 51 | 5 | 17.28 | .001 |
| Yes | 58 | 13 | 104 | 8 | | |

Table 5.

Crosstabulation of Demographic Variables and Condom Use

| Ethnicity | <u>Condom Use</u> | | χ^2 | Φ |
|------------------------------|-------------------|------------|----------|--------|
| | <i>No</i> | <i>Yes</i> | | |
| Other | 43 | 81 | 4.62 | .04 |
| White | 100 | 114 | | |
| Romantic Relationship | | | | |
| Yes | 102 | 115 | 4.91 | .03 |
| No | 43 | 81 | | |

White participants were less likely to use condoms the last time they had sexual intercourse than participants who identified as another race/ethnicity. Participants in a romantic relationship were less likely to use condoms than those not in a romantic relationship. The majority of participants who were categorized as American, also reported not using a condom the last time they had sexual intercourse. The majority of participants who were categorized as bicultural, reported using a condom the last time they had sexual intercourse.

Participants who reported being a minority (non-White) and participants who reported being African American were less likely to report being more acculturated to the dominant culture, were more likely to mark answers that put them in the “other” or

“both” categories of acculturation and less likely to mark answers on the acculturation measure that put them in the “neither” category.

Correlations Among Predictor Variables

Correlation results demonstrated that individuals who reported less perceived risk also reported higher self-positivity bias and less stigma and fewer supportive peer norms towards safe sex practices. In addition, HIV-related stigma and unsupportive peer norms towards safe sex practices were also positively correlated; individuals with more peer norms towards unsafe sexual practices also reported more HIV/AIDS stigma.

Correlations are presented in Table 6.

Table 6.

Correlation matrix of all predictor variables

| <i>Scales</i> | 1 | 2 | 3 | 4 | 5 |
|-------------------------|----------|----------|----------|----------|----------|
| 1. Self-positivity Bias | -- | | | | |
| 2. Sexual Knowledge | -0.10 | -- | | | |
| 3. AIDS Stigma | 0.02 | 0.21 | -- | | |
| 4. Perceived Risk | -0.11* | -0.09 | 0.19** | -- | |
| 5. Peer Norms | -0.10 | -0.04 | 0.11* | 0.31** | -- |

Note. *N* ranged from 331 to 376 due to missing data * $p < .05$. ** $p < .01$.

Prediction of Condom Use

The hypothesized model explored the mediating effect of HIV-related stigma between sexual knowledge and condom use; the moderating effect of acculturation on HIV-related stigma and condom use; the mediating effect of perceived risk between peer norms and condom use as well as the mediating effect of perceived risk between self-positivity bias and condom use. Based on the relationships presented in the model (Figure 2, page #47), a standardized coefficient was estimated for each of the paths.

Furthermore, the model also included race/ethnicity and gender as independent variables.

The assessment of goodness of fit documented that this model was not an adequate fit, but did illustrate seven significant paths ($\chi^2 = 28.828$, $p=0.0002$, degrees of freedom=7, $N=299$). CFI = .742, TLI = .005; RMSEA =0.103 (see Figure 3). Figure 3 only illustrates the significant paths; however, the results for all paths are on the following page. In addition, it is important to note that *Mplus* allows use of missing data for the outcome but does not do the same for predictors when utilizing a categorical outcome, thus, accounting for the exclusion of some cases used in analyses.

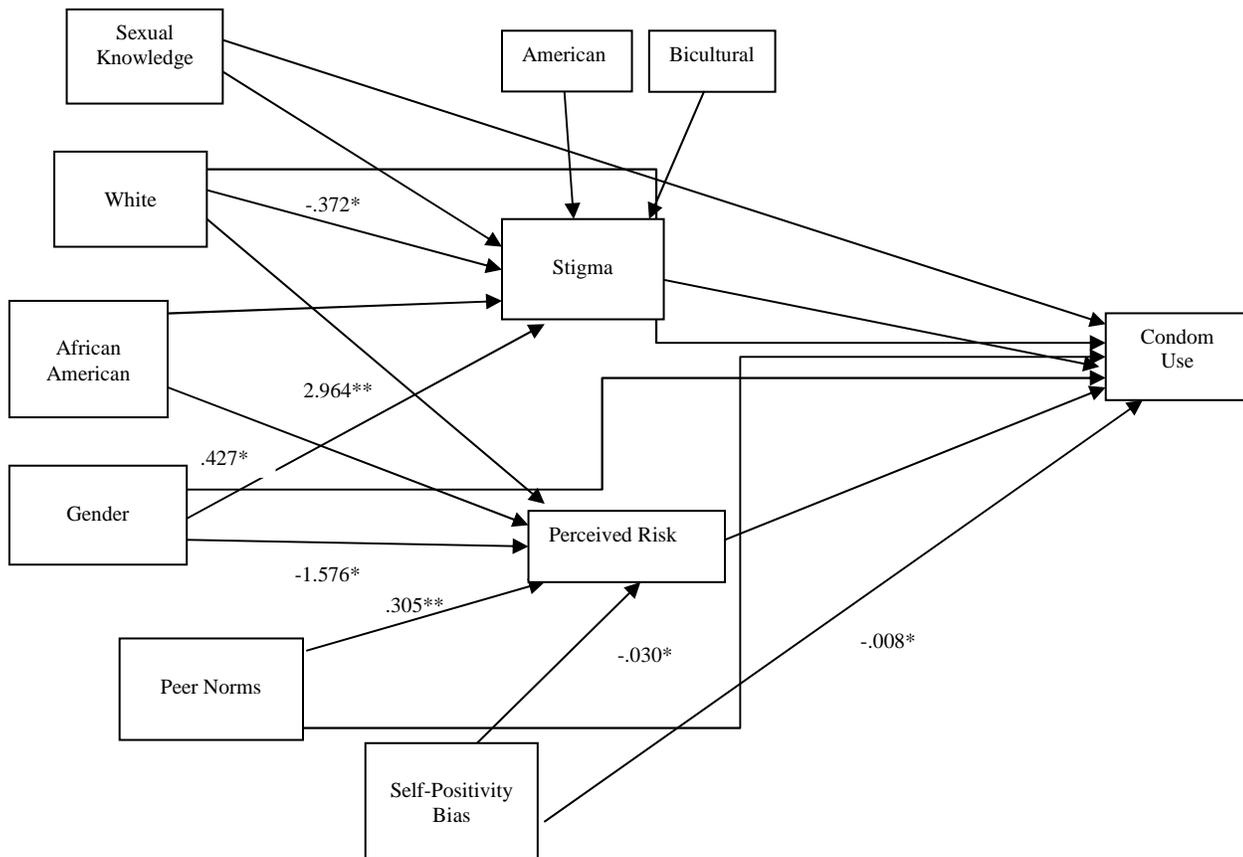


Figure 3. Model path analysis with ethnicity, gender and acculturation as a moderator.

The path analysis results indicated that Hypothesis I was partially supported. There was a direct significant relationship between self-positivity bias and condom use,

as well as a significant relationship between perceived risk for HIV and self-positivity bias, but not a significant relationship between perceived risk for HIV and condom use. However, as hypothesis II suggested, there was not a significant relationship found between knowledge about HIV transmission through sexual activities and sexual risk behavior, nor was the relationship mediated by stigmatization of persons with HIV/AIDS. Finally, the path analysis did not support Hypothesis III. There was not a significant relationship between stigmatization of persons with HIV/AIDS and condom use and acculturation did not significantly moderate this relationship.

Hypothesis IV proposed a significant relationship between peer norms and condom use with mediation by perceived risk for HIV/AIDS. As peer norms increases, perceived risk for HIV/AIDS decreases. As perceived risk for HIV/AIDS decreases, condom use decreases. This relationship was not supported, however, there was a significant relationship found between risky sexual peer norms and perceived risk, but it was a positive relationship, indicating the more peer norms that support risky sexual behaviors, the more one perceives oneself to be at risk for contracting HIV.

Other significant findings included: being female was significantly associated with higher levels of HIV/AIDS stigma $\beta = 0.427$; being male was significantly associated with higher levels of perceived risk ($\beta = -1.576$); being a minority (not White) was significantly associated with higher levels of HIV/AIDS stigma $\beta = -0.372$; being African American was significantly associated with higher levels of perceived risk ($\beta = 2.964$).

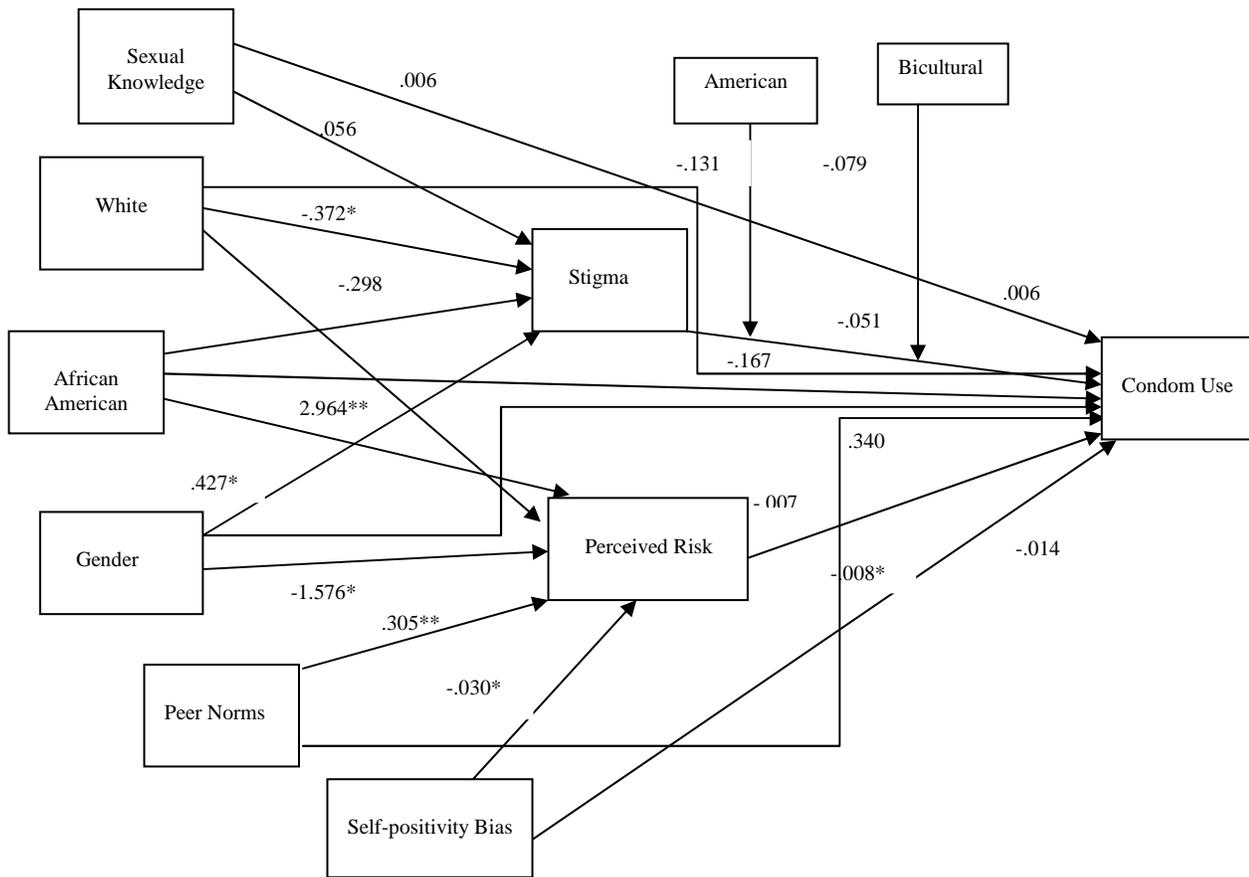
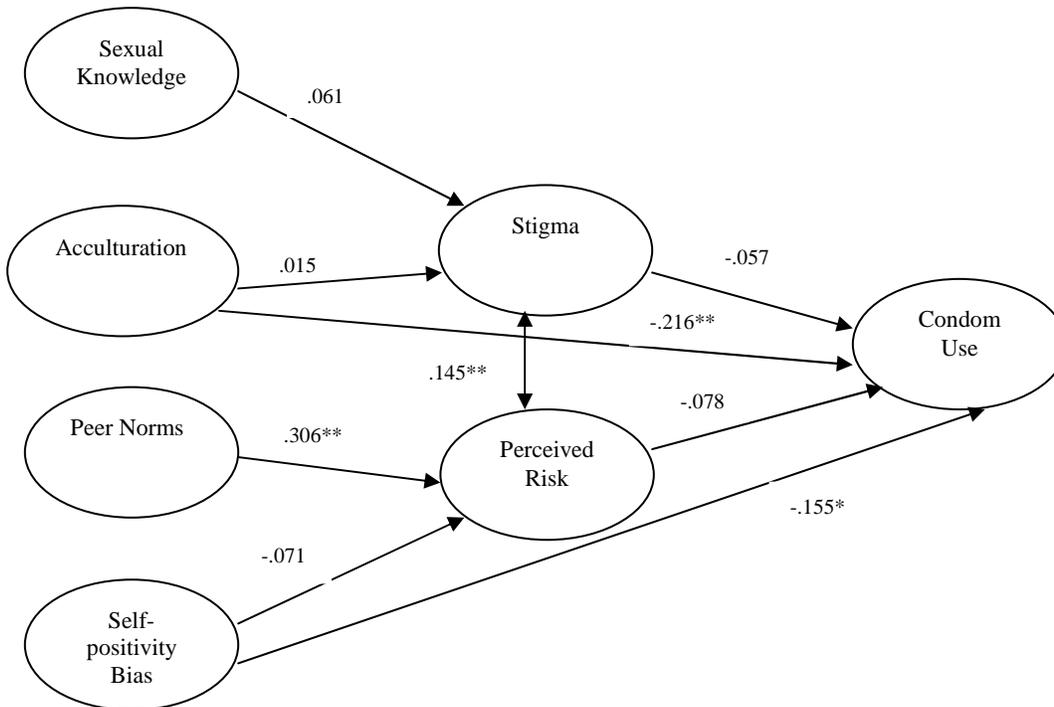


Figure 4. Full Model Path Analysis Results

Other models that were tested and showed a good fit will be described briefly and future studies should examine these hypotheses. Extant literature illustrates a negative relationship between acculturation and condom use; the more one connects with the majority culture, the less condom use (Ratti, Bakeman, & Peterson, 2000; Schwartz, et al., 2011). Therefore, the model was modified by adding a direct path between acculturation and condom use. *Mplus* suggested creating a correlation between perceived risk and stigma, which is also supported in the literature (Riley & Baah-Odoom, 2010; Rosenheck; Ngilangwa; Manongi; Kapiga, 2010). The assessment of goodness of fit

documented that this model did fit data well. (Figure 3)($\chi^2 = 6.643$, $p=0.3549$, degrees of freedom=6, N=256). CFI = .981, TLI = .956; RMSEA = .020.

Figure 5. Model of adjusted path analysis.



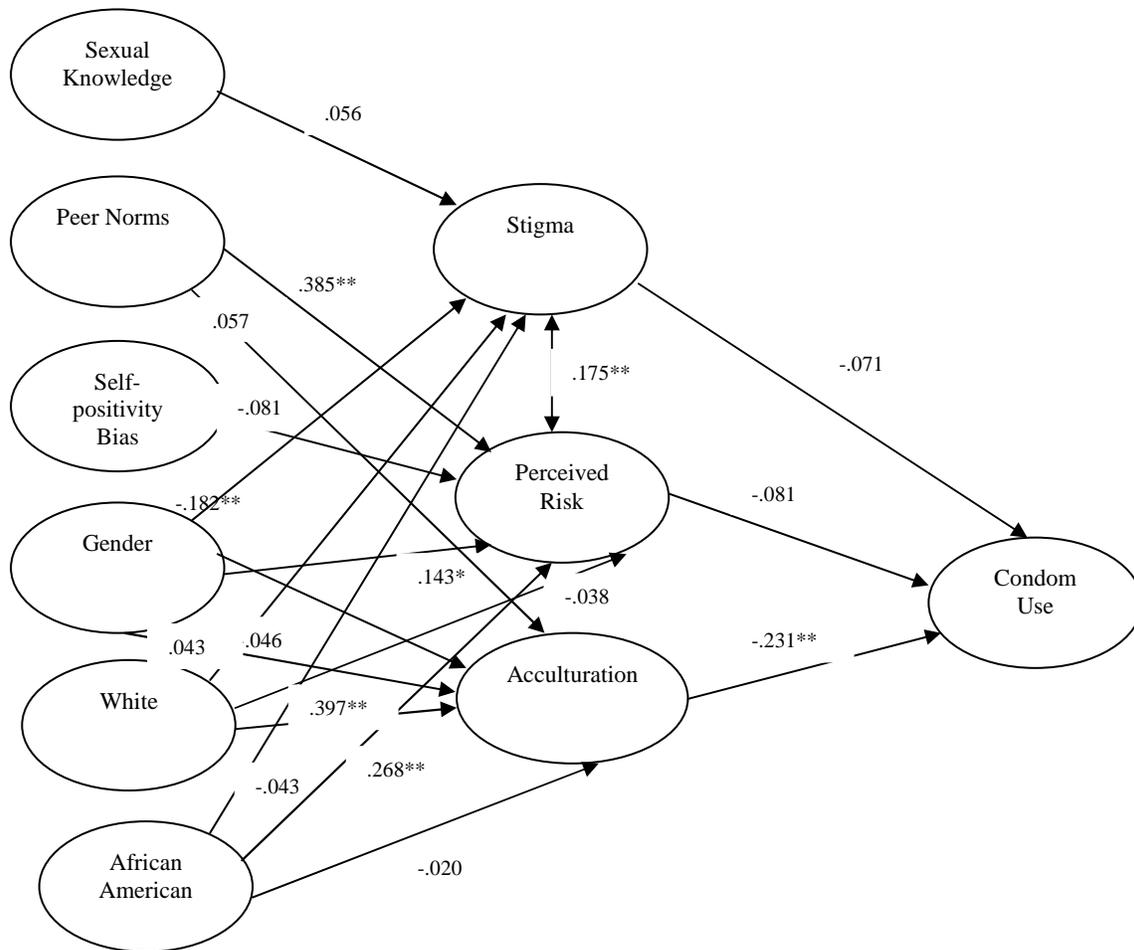
The following relationships were found to be statistically significant in the above model:

- (1) higher levels of peer norms were associated with higher levels of perceived risk [β (standardized coefficient)= .306; that is, an increase in peer norms by one standard deviation from its mean results in a increase of perceived risk by .306 standard deviations from its own mean];
- (2) higher levels of acculturation were associated with lower levels of condom use ($\beta= -.216$);
- (3) higher levels of self-positivity bias were associated with lower levels of condom use ($\beta= -.155$);
- (4) there was a significant positive correlation between stigma and perceived risk ($\beta= .145$).

In summary, when the relationships (paths) from acculturation to condom use and between stigma and perceived risk were added to the original hypothesized model, a good fit for the data was found. Within the model, there were four significant paths, including the more one is acculturated to American customs and values, the less they use condoms; the more a person perceives themselves to be invincible to contracting HIV/AIDS, the less they use condoms; the more unsupportive peer norms one has, the more perceived risk they have; and, higher stigma of HIV/AIDS is correlated with higher perceived risk.

A third model that included ethnicity and gender as independent variables and acculturation as a mediator was also tested. The assessment of goodness of fit documented that this model did fit data well and had more significant paths than the previous model. (Figure 4)($\chi^2 = 11.528$, $p=0.4843$, degrees of freedom=12, N=243). CFI = 1.0, TLI = 1.013; RMSEA =0.00.

Figure 6. Model path analysis with ethnicity and gender.



The following relationships were found to be statistically significant in the above model:

- (1) males were significantly associated with higher levels of stigma [β (standardized coefficient) = $-.182$; that is, the correlation between the residuals of males and stigma is $-.019$]
- (2) higher levels of unsupportive peer norms were associated with higher levels of perceived risk ($\beta = .385$), that is, an increase in peer norms by one standard deviation from its mean results in an increase of perceived risk by $.385$ standard deviations from its own mean;
- (3) females were significantly associated with higher levels of perceived risk

($\beta = .143$). (4) African Americans were significantly associated with higher levels of perceived risk ($\beta = .268$). (5) Whites were significantly associated with higher levels of acculturation ($\beta = .397$). (6) Higher levels of acculturation were significantly associated with no condom use ($\beta = -.231$). (7) There was a significant positive correlation between stigma and perceived risk ($\beta = .175$). Future studies should look third suggested model, which fit the data best and illustrated the most significant paths that are theoretically supported in the literature.

Discussion

The purpose of this study was to identify factors that may impact condom use among college students who live in an area where the prevalence of HIV is relatively high. Specifically, the present study examined the relationships among the variables HIV-related sexual knowledge, acculturation, self-positivity bias, peer norms, HIV-related stigma, perceived risk, and the outcome variable (condom use) utilizing path analysis. Although the mediation models performed for this study cannot be interpreted in their entirety given their poor fit, it is possible to discuss the direction of the significant effects found within the models.

Self-positivity Bias, Perceived Risk, and Condom Use

First, it was hypothesized that a negative association would be found between self-positivity bias and condom use. It was also hypothesized that this relationship would be mediated by perceived risk for HIV. Specifically, as self-positivity bias increased, perceived risk for HIV/AIDS would decrease, and as a result, condom use would decrease. The hypothesized relationships were partially supported; more self-positivity bias was found to be associated with less perceived risk and less condom use in the current study, however, perceived risk did not mediate the relationship. These findings

are supported in previous research. People who believe they are invincible to contracting HIV/AIDS (i.e., self-positivity bias) also perceive themselves to be at less risk of contracting HIV/AIDS (Harman, O'Grady, & Wilson, 2007). Previous research also supports the finding that more optimistic bias is associated with less condom use (Ross & Bowen, 2010). College students tend to put their peers in a higher risk category than themselves, this is called the "it cannot happen to me syndrome" (Carey, Bosari, Carey, & Maisto, 2006). Research illustrates that this belief is pervasive on college campuses (Harman et al., 2007; Pons-Salvador, Díaz, & Guillén-Salazar, 2010).

By using perceived risk as a mediator, the current study aimed to illustrate that having a high level of perceived risk would determine if people with high levels of self-positivity bias would use condoms. However, current findings illustrate that high endorsements of self-positivity bias are associated with less condom use for those who perceive themselves as well as those who do not perceive themselves to be at risk of contracting HIV/AIDS, emphasizing the need for interventions to find a way to target the construct self-positivity bias and focus less on perceived risk.

Several explanations may help clarify the non-significant mediation and answer the question "why do adolescents and young adults believe they are invulnerable even though they label their behaviors as risky?" First, a brief explanation of the contributing theories to optimistic bias is warranted. The construct optimistic bias/self-positivity bias is related to Elkind's (1978) "personal fable", which describes a formal operations stage of cognitive growth in adolescents. He states that Piaget's theory of cognitive development parallels the intellectual processes that can impact behaviors. Elkind indicates that egocentrism developed at the same time as imaginary audience and personal fable. Personal fable encompasses the idea that the imaginary audience is only watching "you" and that "you are special", which

can evolve into the belief that bad things can happen to others, not “you”: the core of optimistic bias. This over-differentiation of the self can also lead to beliefs about health (e.g., “They might get HIV if they do not use a condom, but it will not happen to me”). A researcher on health communications also indicated that personal fable is a result of egocentrism and causes adolescents to ignore health messages (Greene et al., 1996). Lapsley (1996) goes further in his interpretation of egocentrism, imaginary audience, and personal fable, emphasizing that personal fable is part of separation-individuation in adolescent development. Lapsley states that within the process of separating the present from the past, invulnerability is an adaptive illusion that protects ego development. This developmental process pertains to college students because college is typically a time when students are moving away/separating from families, becoming more autonomous. Research has supported the idea that egocentrism does not begin and end in adolescence, impacting the college years (Peterson & Roscoe, 1991; Rycek et al., 1998). Lapsley (2002), concluded that invulnerability has two sides; it can serve as a protector to an individual (i.e., protect the ego and promote resilience) as well as contribute to risky behaviors. Thus, college students may engage in sexual behaviors that they recognize as risky, but are able to ignore those beliefs through these protective beliefs of invulnerability. In sum, the theories behind optimistic bias can explain why college students acknowledge/label their behaviors as risky, but believe they are invincible and thus do not use condoms. In conclusion, beliefs about risk (endorsing high levels of perceived risk of HIV/AIDS infections) are not sufficient to predict sexual behaviors due to factors such as unrealistically believing that one is at less risk than peers.

In addition, examining how the current study measured self-positivity bias might also explain why perceived risk was not a mediator. Optimistic bias was calculated by

subtracting the self rating from the risk of the average undergraduate, and the current sample was approximately 63% first year students. Like previously stated, college is a time for young adults to explore themselves and transition into adulthood (separation-individuation process) and is typically the first time living away from their home. Thus it is possible that if the majority of participants were second year students or above, the students would have a better idea of their cohorts on campus and rate themselves more closely to them. Said differently, freshman might feel very different from other students because they have only just become part of the college social network, whereas, second year students and up might feel more connected to other students and therefore rank their chances of contracting HIV/AIDS to other undergraduates as more similar. In fact, the current study found that first semester students endorsed significantly higher levels of optimistic bias than the second semester students who participated in the study. This supports the aforementioned suggestion that even a semester could foster more connectedness to other undergraduates and comparison of self to others.

Another possible explanation of the current finding that perceived risk did not mediate the relationship between optimistic bias and condom use, could be a result of question order bias. The measure of optimistic bias came prior to the measure of perceived risk in the current study questionnaire. Thus, it is possible that if the students had taken the self-positivity bias measure after the perceived risk measure that the students would have been thinking in more concrete terms about their risk. For example, this question from the perceived risk measure, “How sure are you that sex partner(s) have NOT been exposed to AIDS?” might have reminded them of their actual risky behaviors and influenced their comparison of self to the average undergraduate. Future studies

should utilize question randomization or make several versions of the survey in order to eliminate this bias.

The current study did not find a direct association between perceived risk of HIV/AIDS and condom use. Literature illustrates that perceived risk is not always a good predictor of sexual risk behaviors (de Visser & Smith, 2001; Scandell & Wlazelek, 2002). Gerrard, Gibbons and Bushman (1996) reported that “decisions regarding sexual risk taking are highly vulnerable to emotional interference, and, therefore, may not be as rational as decisions involving precautionary measures that are less emotion laden, such as wearing a seat belt or getting a flu shot”. (p.401). Other factors such as optimistic bias, condom self-efficacy, communication ability, in conjunction with risk assessment might also influence the decision and enactment process.

In relation to the ARRM, these findings illustrate mixed support for the model. Participants who labeled themselves at risk of HIV/AIDS infection (stage one of ARRM), did not engage in more condom use (stage three) than those who did not rate themselves at high risk of HIV/AIDS infection. According to the model, these results illustrate that students are not committing to behavior change (stage two). Furthermore, results from hypothesis one also illustrate that optimistic bias is a factor affecting labeling one’s behavior as risky, the more optimistic bias, the less perceived risk (all in stage one). These results help explain labeling one’s behavior as risky, and do encourage interventions to focus on reducing optimistic bias.

Interestingly, the current results also illustrated that participants who endorsed more self-positivity bias also indicated they were less likely to use condoms the last time they had sexual intercourse. Is there something going on in stage two, commitment, that

is impacting condom use? Assuming that optimistic bias is in stage one and related to risk assessment, could this mean that the students have committed to change? Then what variable, according to the ARRM, might be influencing commitment to use a condom? Believing that using a condom will be effective? Believing that the negative effects of how a condom feels during sex does not outweigh the risk of not using one? Or, do they believe they can use a condom effectively? Lastly, could self-positivity bias be influencing both stage one, labeling, and two, commitment? Future studies should examine these stage two factors in order to demystify the relationship between optimistic bias and condom use.

Sexual Knowledge, HIV/AIDS Stigma and Condom Use

The second hypothesis of the present study examined the relationships among sexual knowledge, stigma towards people with HIV/AIDS, and condom use. It was expected that there would be a positive relationship between knowledge of HIV transmission through sexual activities and condom use, and this relationship would be mediated by stigmatization of persons with HIV/AIDS. As knowledge about HIV transmission through sexual activities increased, stigmatization of persons with HIV/AIDS would decrease, and as a result, condom use would increase. Results did not support any of the hypothesized relationships. The extant literature on knowledge about HIV transmission contains contradictory findings. Recent research has concluded that knowledge regarding how HIV/AIDS is transmitted, does not result in safe sexual behaviors (Alleyne, 2008; Lance, 2001; Winfield, & Whaley, 2002). In fact, Bruce and Walker (2001) examined the results of the AIDS attitude Scale with a total of 1571 undergraduates over a 15-year period. Their findings highlighted that perceived knowledge about HIV has increased over time, while the CDC states that college students continue to behave in risky sexual

behavior (CDC, 2010). However, there was one study, Bazargan et al. (2000) that found a significant correlation between HIV sexual knowledge (included only sexual modes of transmission in analysis) .Therefore, the current study included their measure, hoping to support their findings and clarify the knowledge gap. Unfortunately, there were no significant relationships found in this study. It is possible that the results differ from Bazargan’s study because their sample was only African American college students; perhaps high levels of HIV sexual transmission knowledge impacts sexual behavior in this population. Future studies that utilize a sample of African American college students could include this measure in order to further explain Bazargan et al.’s findings. Or, on the contrary, the current findings provide support for previously mentioned research and statistics that illustrate knowledge levels are not important in interventions, this could especially be true in a more educated population like college students. Thus, future interventions could stop focusing on increasing knowledge and focus more on other variables (e.g., communication skills, condom self-efficacy).

Furthermore, the null finding that stigma and condom use are unrelated could be a result of campus organizations attempting to de-stigmatize sexually transmitted diseases through educational events that are especially targeted towards the first year students during orientation and other organizations trying to reach out to new students (students in the study were 63% first year students). The present findings might be different if the study was replicated with students in their sophomore, junior, and senior years.

In addition, another possible explanation for this null finding could be attributed to the sample. In the current study, students reported low HIV/AIDS stigma. Because of the low HIV/AIDS stigma, it is possible that students do not think that having HIV/AIDS

is something that would be difficult for them to navigate. In fact, Demmer (2003) found that college students no longer practiced safe sex because of the advances in treatments for HIV/AIDS. New treatments, combined with low stigma towards people with HIV/AIDS could lead to less safe sexual practices. Furthermore, it is possible that students do not know anyone with HIV/AIDS and therefore do not have an opinion (negative or positive) about them and therefore have less perceived risk of infection and do not worry about using condoms to prevent infections. Further research should examine the relationship among perceived risk, stigma, and condom use.

Stigma, Acculturation and Condom Use

The present study also explored the relationships between stigma, acculturation, and condom use. It was expected that there would be a significant relationship between stigmatization of persons with HIV/AIDS and condom use. This relationship would be moderated by acculturation; stigmatization of persons with HIV/AIDS would depend on level of acculturation. Results did not support any of the hypothesized relationships.

The majority of students identified with being bicultural. However, according to the present findings, different categories of acculturation did not predict levels of HIV/AIDS stigma and facilitate explanation of how stigma interacts with condom use. It may help to review how acculturation was measured. Acculturation in the current study was measured by answering 23 items for which respondents compare various subject domains to their self-identified cultural group and to American culture. Four typologies were derived from the scale and each participant was labeled with one of the typologies depending on their responses: (1) American Oriented, (2) Other Non-American Culture Oriented, (3) Bicultural (oriented in both about equally), and (4) Marginalized (oriented in neither). It is possible that in urban college campuses, students from distinct cultures

are being inundated with American values and behaviors at the same time and that although they might not affiliate more with being American, they still absorb certain “American” values and messages which impact their sexual behavior. As a result, acculturation levels are not an indicator of sexual behaviors. However, acculturation might be influential in other settings where there is less education and fewer cultures interacting on a daily basis. Therefore, organizing interventions to target different cultures within a college setting may not be necessary.

In addition, the goal of the PAN is to identify where participants fall in terms of how much American culture influences them and how much their culture of origin influences them. This goal is in accordance with Schwartz, et al.’s (2011) previously mentioned study of college students that discussed the immigrant paradox and suggested that studies need to look at how much one retains of their heritage culture and how much one adapts the U.S. culture. However, similar to Schwartz et al.’s findings, the results found no relationship among acculturation and sexual risk behaviors. To take it a step further, within this sample, what exactly does bicultural indicate for specific groups of people? The current sample was mostly White (62%) and 19% African American. According to research, different ethnic groups can adapt differently to U.S. culture (Dana, 1998), and different ethnic groups have distinct positive and negative cultural attributes that can impact stigma and condom use. Shedlin, Decena, and Oliver-Velez (2005) studied acculturation and HIV risk behaviors in 86 Latino immigrants and found that exposure to new American culture affects HIV risk and prevention and that maintaining some connections to country of origin has both positive and negative risks. Maybe future

research should aim to identify positive and negative attributes for each culture to clarify these contradictory results.

Another possibility would be to have a larger sample of minorities in order to examine more relationships between and among ethnic groups. For example, research indicates different risky behaviors for Haitians and African Americans (both categorized as “Black” in the study) (Villanueva, Darrow, Uribe, Sanchez-Brana, Obiaja, & Gladwin, 2010). Furthermore, future studies also need to look at generational status. Most research illustrates that time living in U.S. for families and individuals impacts levels of acculturation; first generation individuals typically are less acculturated. Second and third generation Latinos are at higher risk for contracting STD’s because it is typically at this point that they let go of some of their previously held health beliefs and begin drinking alcohol and taking drugs. These behaviors can impact their decision making and increase their sexual risk behavior (Myers & Rodriguez, 2002). However, it is important to recall that the aforementioned study (Schwartz, et al., 2011) found both first- and second-generation immigrant students engaged in health risk behaviors at similar rates; the authors believe that this indicates that college students, regardless of generational status, adapt to U.S. culture at the same rate due to the college environment.

In conclusion, there are many variables within the diversity that typifies ethnic groups being represented on college campuses, thus making it difficult to understand how to intervene. Like previously stated, it might be that college students, especially students who have been in college for at least a semester or more, are relatively similar in their adoption of American values, or at least their knowledge of them. Lastly, generational status could be more informative due to the impact of having parents that were born and

raised in the United States versus growing up in a household where the relatives immigrated to the United States.

Perceived Risk and Peer Norms

The last hypothesis expected to find a negative relationship between unsupportive peer norms and condom use, and that this relationship would be mediated by perceived risk for HIV/AIDS. As risky sexual peer norms increased, perceived risk for HIV/AIDS would decrease. As perceived risk for HIV/AIDS decreased, condom use would decrease. The positive correlation that was found between risky sexual peer norms and perceived risk of contracting HIV/AIDS was contrary to the hypothesized relationship. However, previous research does illustrate varying results. For example, Hou (2009) found in his study that compared White students from traditionally White universities with African American students (from traditionally African American Universities), that African American students reported higher perceived risk and more risky sexual peer norms than the White sample. Other research has shown the reverse relationship between risky sexual peer norms and perceived risk; the more one's peer group participates in risky sexual behavior, (i.e., less condom use, multiple sexual partners), the less perceived risky behavior they portray (Carey, Bosari, Carey, & Maisto, 2006; Selvan, Ross, Kapadia, Mathai, & Hira, 2009). The rationale supporting this belief is that individuals observe their cohorts participating in certain ways and (presumably) not being infected with HIV/AIDS and this influences how the individual behaves. The current findings could indicate that perceived risk is not as important as peer norms in looking at what influences behavior, particularly among college students. This finding suggests that college students might have knowledge that their friends have contracted sexually

transmitted diseases through high risk behaviors, therefore they endorse unsupportive peer norms towards safe sex and they also know that they are at risk too because they also do not use condoms. Thus, future research could ask participants about their sexually transmitted disease status to elucidate this relationship.

The current finding could also be influenced by exposure to HIV/AIDS information. College students are not able to completely ignore/distance themselves from the information on college campus regarding HIV/AIDS transmission (i.e., <http://www.yourstrategy.org/faq.html>), and thus do understand how it is transmitted and report their risk of infection accurately. For example, sexually transmitted disease education is pervasive throughout campuses, including posters, awareness/education events held in public display and courses that incorporate sexual education, something that non-college students can possibly avoid. Future studies could include questions/measures regarding campus-related education about sexually transmitted diseases, in order to understand how much HIV/AIDS education participants have been exposed to on campus, (e.g., Have you read information regarding HIV/AIDS transmission or been a part of a lecture or intervention regarding HIV/AIDS transmission on campus?)

Model Findings Among Demographic Variables and Study Variables

Gender Differences. The current study explored gender differences in the model and found that males endorsed higher levels of perceived risk, while females endorsed higher levels of HIV/AIDS stigma. Recent literature that examines gender differences related to HIV perceived risk and stigma among college students, especially in the United States, is limited. However, previous research does supports the finding that, compared to

females, males put themselves at greater risk for contracting HIV/AIDS because they typically have more partners than females, and engage in riskier behavior (e.g., drinking alcohol before sexual intercourse) (Duggan, Lapsley, & Norman, 2000; Goossens et al., 2002; Nkansah-Amankra, Diedhiou, Agbanu, Harrod, & Dhawan, 2011). Thus, males in the current study could rate their risk higher by basing it on their number of sexual partners. Future studies could compare numbers of sexual partners to provide support for this hypothesis. This finding also underscores the importance of risk assessment--examining what information people use to decide perceived risk (e.g., number of partners, condom use) and the best way to represent this in research.

In addition, previous research among college students highlights power differentials being the cause of gender differences in risky behavior (Bazargan et al., 2000; Collins, 2006; Friedman et al., 2002). For example, Ferguson et al. (2006) compared African American gender differences in a qualitative study, which sampled 31 African American undergraduates. Findings underscored that female college students did not use condoms for the following reasons: they were in long-term relationships, they were emotionally attached, they feared rejection from that partner, lack of communication skills regarding condom use, and the most common fear was that their male partners might think they were unfaithful if they began this new behavior (initiating condom use). In relation to the aforementioned study, it is possible that females, in the current study, endorsed lower levels of perceived risk because of the stigma they have towards people with HIV/AIDS. Said differently, despite confidentiality, admitting a high level of perceived risk on the study, would be like asking a partner to use a condom and open up other questions about a disease they want to avoid.

Current findings illustrate that females have more HIV/AIDS stigma than males. Although my literature search did not yield any studies that examined stigma towards people with HIV/AIDS in a college population located in the United States, there are studies that found relationship among females and stigma and sexual behaviors that may help clarify the current findings. A study that surveyed 1,629 women found that participants who believed they might have HIV/AIDS also had high stigma towards HIV/AIDS (Rosenheck, Ngilangwa, Manongi, & Kapiga, 2010). Thus, it is possible that the females in the current study believed they might have HIV/AIDS, which resulted in higher levels of stigma. In addition, there is research illustrating that females living with HIV/AIDS have a lack of acceptance of the disease (Chowwen, 2003 and 2004). Compared to HIV-positive males, HIV-positive females may be more stigmatized because of the association between sexual transmission of HIV and promiscuity (UNAIDS, 2004). Consequently, women have been found to be more vulnerable to social rejection than men (UNAIDS, 2004). The current study's result that females stigmatize people with HIV/AIDS more than males, could be related to the previous statements. Meaning, they might believe that HIV/AIDS is a disease that is transmitted by unsafe sexual practices that might imply untoward sexual behavior of the person with HIV/AIDS, a characteristic that females stereotypically avoid and for which males stereotypically are braggarts. Thus, females would want to distance themselves from HIV/AIDS more than males in order to avoid being labeled negatively. Future research could elucidate these findings by using a measure among college students and/or females that are not HIV-positive that examines specific beliefs about why females distance themselves from HIV/AIDS more than males.

A discussion in the literature worth mentioning highlights the need for interventions to target males and females separately (Brown, 2008). “The topic of gender differences and HIV is of relatively recent exploration, though its implications are vast in terms of social and medical intervention, prevention efforts, and appropriate and effective treatment”. Again, underscoring the lack of extant literature that investigates gender differences related to HIV risk behaviors and the need for interventions to target them separately. O’Leary, Jemmott, and Jemmott III, (2008) conducted analyses of a successful HIV/STD risk-reduction intervention for African American females in order to identify which theory-based factors attributed to the reduction of STD’s and self-reported sexual risk behavior. The intervention significantly improved all potential mediators except condom use knowledge, hedonistic beliefs, and self-efficacy for impulse control. Results further illustrated that partner reaction, partner approval of condom use, self-efficacy for condom carrying, and self-efficacy for condom use were significant mediators. The authors concluded that the results underscore the importance of self-efficacy in relation to the effects of skill-building sexual risk-reduction interventions on females condom use. This recent intervention analyses provides further support for the need to separate gender in HIV prevention interventions.

Racial/Ethnic Differences. The current study also explored differences among ethnicities/races in the model. Specifically, the current study compared African Americans to all other ethnicities and Whites to all other ethnicities and found that African Americans perceived more risk of HIV/AIDS than Whites, Asian Americans, Native Americans, and Hispanics, and that minority college students endorsed higher levels of stigma towards people with HIV/AIDS.

It is possible that Duncan et al. (2005) was correct in his interpretation that a community with a high prevalence of HIV/AIDS could foster more risk awareness, despite possible HIV-related stigma. Darrow et al. (2010) also reported in his study that supports “Black” populations tend to have more HIV/AIDS stigma and perceived risk, but do not necessarily practice safe sex. Lastly Hou (2009) compared White (n=335) and African American (n=222) college students’ sexual risk behaviors and found that African Americans perceived themselves to be at higher risk of HIV/AIDS contraction and had higher peer norms toward vaginal and anal sex.

Although the current study found that African Americans had more perceived risk than other ethnic groups in the study, the overall levels of perceived risk in the current study were low. Perceived risk being low among college African Americans is also supported in the literature (Payne, Beckwith, Davis et al, 2006). It is possible that although African American college students have low levels of perceived risk, they still endorsed higher levels of perceived risk compared to other ethnic groups in the study because in the general population, African Americans are a high risk group.

In addition, results of the current study indicated that minorities endorsed more stigma towards people with HIV/AIDS than White participants. Extant literature supports this finding (Darrow, Montanea, & Gladwin, 2010). Furthermore, research suggests that stigma of HIV/AIDS can be a barrier to education and prevention efforts (Burkholder, et al., 1999; Duncan, Harrison, & Toldson, 2005; Riley & Baah-Odoom, 2010), and African Americans and Latinos are a high risk group for HIV/AIDS. Thus breaking down stigma barriers through interventions could facilitate more discussion among students and less stigma, theoretically leading to safe sexual behaviors.

Current Results and Duncan and Burkholder Results

Similar to Duncan et al. (2005), the findings from this study indicated that higher stigma was not correlated with less knowledge. Current study results could be similar to Duncan et al., because the demographics were more similar than the rural White sample in Burkholder, et al.'s (1999) study; thus, illustrating the need to understand cultural differences, not only examining different races/ethnicities, but also college culture.

Furthermore, Burkholder et al. (1999) found that stigma was positively correlated with less knowledge which was negatively correlated with risk behavior. The authors, like previously stated, believed that this could be because people distance themselves from anything to do with the disease for fear of public association. Burkholder et al.'s was also in a rural setting, unlike the current study, in an urban setting. It is possible that the result that higher HIV-related stigma is associated with being female and with being a minority could be because students cannot distance themselves from risky behavior information in a setting where the prevalence of HIV/AIDS is higher, and thus report a higher perceived risk.

In conclusion, this study is unique in that it utilizes a college population in an urban setting. Previous studies utilized non-urban samples, such as individuals from developing countries, samples taken from drug clinics, and other non-college populations. It is important to keep this in mind when generalizing the results. The urban college population is unique in that it is a relatively educated group of diverse individuals. In addition, they are who are most likely living on their own for the first time and exposed to different cultures, values, and relationships, all which could alter their previously held beliefs and behaviors.

Strengths and Limitations of Current Study

There are some noteworthy strengths of the current study. First, the data analysis lent itself to more sophisticated statistical techniques (e.g., SEM/path analysis), which allowed all variables to be examined together in one model. The current study also utilized the most sophisticated tool, Mplus, for analyzing path analysis that is available. Furthermore, the sample size was relatively large, $N=397$, with a relatively accurate representation of the college population being studied. The large sample size in the current study allowed for enough power to examine the relationships together in one model utilizing path analysis, as opposed to doing separate regression analyses. Moreover, it allowed for the study of ethnic/racial group and gender differences within the model.

Furthermore, the acculturation scale was not a uni-dimensional measure of acculturation. Researchers believe that utilizing a measure that allows categorizing an individual as bi-cultural more adequately represents one's connection with a new culture. Said differently, an individual can be attached to their culture of origin as well as the dominant culture and thus, a continuous measure of acculturation would not capture the individual's true cultural being.

It is also important to consider the limitations to this study when interpreting the findings. A cross-sectional design does not offer a comprehensive understanding about the relationships among the study variables. Therefore, one cannot state that optimistic bias affects condom use, for instance, or whether level of risky sexual peer norms determines one's perceived risk of HIV/AIDS. Because the findings are correlational, the results can only determine relationships between variables, analyze the strength and direction of these associations, and not assert causal implications. In addition, there were 98 cases excluded in

the path analysis due to missing data, and although listwise deletion is accepted as a good method of dealing with missing data, especially when there is a lot of missing variables, another method would have been to compute the mean for each missing score in order to avoid having to exclude that many cases. Or, another method that could have been employed, is full information maximum likelihood (FIML) when data were missing. FIML procedures estimate model parameters from all of the available information relevant to each parameter (e.g., fits the covariance structure model directly to the available raw data available for each participant). In other words, FIML procedures utilize all cases within a dataset, including missing data. All methods of handling missing data have caveats, and because the research illustrates that listwise deletion is a common , although it can lower the sample size, it often works well (Allison, 2002). Furthermore, data transformations (e.g., computation and FIML) can alter the fundamental nature of the data, such as changing the measurement scale from interval or ratio to ordinal, and creating curvilinear relationships, complicating interpretation. Another limitation to this study involves its methodology. Participants completed a series of self-report questionnaires through an online server tool that has its limitations. For example, participants cannot skip a question if the statement does not apply to them; they must read each question and select "decline to answer". In addition, this study relied exclusively on self-report behaviors and beliefs. An inherent limitation of self-report measures is a social desirability response style. Thus, it is possible that some participants may have endorsed socially acceptable responses (Kazdin, 2003) and that group differences could be a result of social desirability bias and/or differences in interpretation of scale items. Furthermore, a social desirability bias may result in common method variance explanations for the obtained findings (e.g., correlations between observed variables may be due to response biases and not actual

relationships between the constructs studied) (Kendall, Butcher, & Holmbeck, 1999). Furthermore, there is the possibility of recall bias since respondents were expected to provide information on previous behaviors (i.e., condom use). Due to a large amount of missing data and the number of participants that had to be excluded due to response time, altering administration method is advised in future studies.

In addition, the self-positivity bias measure had its limitations. Eleven cases (2% of sample) were omitted due to having negative scores on the Self-Positivity Bias measure. It would have been optimal to find a way to include these in the analyses. However, methods such as transforming data, also has its limitations. In addition, the descriptive analysis which included the negative scores compared to a descriptive analysis that excluded the negative scores illustrated very small differences: without negative scores/with negative scores: Mean: 27.45/27.39; Median: 25/25; Mode: 50/50; SD: 21.41/23.2.

Regarding the outcome measure, there is an important limitation. Sexual risk behavior was only measured by inquiring about STD preventative measures used the last time the respondent had sexual intercourse. Future studies should create a sexual risk ratio that includes other risk behaviors such as numbers of partners, intention to use condoms, or consistency of condom use. Furthermore, students could have been using condoms to prevent pregnancy and not STD's and therefore responded that they were not using condoms for STD prevention, but would have responded they were using condoms for pregnancy prevention. In addition, 61% of the students in the sample reported that they were in a relationship and being that 63% also reported they were first year students, this could be a high number of first years in a relationship. Dessunti and Reis (2007) found that the students in their senior year of college were more likely to be in monogamous relationships and therefore used

condoms less frequently with their partner. Thus, one can conclude that being in a relationship is typically correlated with less condom use. Generalizing the current results that contained a large number of first year students in a relationship, to all college students should be done with caution.

The findings from this study are based on a sample of urban, diverse college students on a commuter campus. Thus, it is important to remember that not only are gender and race/ethnicity important to understand, but also socioeconomic status (parent education) and type of college housing; these variables can also diversify the sample and impact results, making them less generalizable.

The literature suggests that an individuals' national origin impacts his/her cultural traditions, values, and beliefs. Moreover, among ethnic groups, particularly Latinos, there are significant within-group differences, including language use, reasons for migration, income, and region of residence in the U.S. The current study not only did not have enough participants in other ethnic groups (i.e., Latinos and Asian Americans), but also did not examine country of origin. The diversity amongst ethnicities may influence the reliability and validity of the measures.

Implications for Future Research and Prevention Intervention

It is important to remember that the majority of previous HIV/AIDS research focuses on MSM, low-income communities, underdeveloped countries, adolescents; college students have mostly been ignored as a risk group (Adedeji, Adefuye, Abiona¹, Balogun & Lukobo-Durrell, 2009). College students typically do not have some of the common risk factors associated with HIV such as poverty, injection drug use, or low levels of education, but they still engage in behaviors that place them at risk for contracting HIV. Therefore, generalizing results from non-college samples is not advised.

Furthermore, according to a Publication of AIDS Research Consortium (2008), HIV/AIDS pandemic has not been on the forefront of research in recent years, and despite an overall decline in cases, a change in groups affected by the disease, as well as advancements in treatment, HIV/AIDS is not decreasing proportionately among college students, underscoring the importance of studying HIV/AIDS with college samples. Furthermore, Demmer (2003) found that college students were not practicing safe sex because of advancements in treatments. Rochon postulates that it would take about 10 years to create a vaccine and even then it would take several more years to perfect the vaccine. Thus, there has been a recent resurgence of HIV/AIDS prevention research. These troubling reports could indicate a need for a focus of vaccine related HIV-knowledge on college campuses. Perhaps utilizing social media (e.g., twitter, face book, YouTube) and other more relatable ways to implement interventions would be instrumental in reaching out to college students in order to stimulate discussions regarding HIV risk behaviors and using condoms. By making stigmatized topics such as HIV risk behaviors more mainstream and accessible to college students in a way they can relate, could foster more discussion amongst students which could then lead to better safe practices and awareness regarding HIV.

Albarracin, et al. (2005) conducted a meta-analysis of previous HIV/AIDS interventions that included a sample of 354 prevention interventions (including those that targeted college students) from the last 17 years and tested the major theoretical assumptions about behavior change. The authors concluded that the most effective interventions were those that contained attitude components, educational information, behavioral skills, and behavioral skills training. They reported that the least effective

interventions were those that attempted to induce fear of HIV. Furthermore, gender, age, ethnicity, risk group, and past condom use directed the different strategies of the interventions. In sum, they reported that HIV-prevention efforts should increase attention to the needs of specific groups, developing new interventions that are of use for these groups. The results of the current study support some of the suggestions gleaned from the meta analysis, specifically, creating interventions that target ethnic groups and males and females separately. In addition, the current study contributes to the literature by indicating a need to target beliefs about the self among college students.

The current study also provides support for using the ARRM in HIV/AIDS prevention research. For example, the results illustrate that African Americans perceive themselves to be at higher risk of contagion than other races, but not necessarily use more caution during sexual intercourse compared with other races. This underscores the need to implement different prevention interventions based on cultural identification. In regards to the ARRM model, African Americans are most likely to perceive themselves to be at risk, thus a focus on the second stage, commitment to change behavior should be investigated in research in order to create appropriate interventions at this stage, such as a focus on perceptions of enjoyment or condom self-efficacy or negotiation. Whereas, according to the present study results, it would be more appropriate to focus an intervention with people who identify with White culture in stage one, labeling themselves as high-risk. Current results indicate that, despite not labeling themselves as high at risk as African Americans, Whites do not engage in any more or less significant condom use than African Americans.

Previous research has illustrated success in decreasing negative behaviors, such as binge drinking and sexual risk behaviors through the POL method (Stevens et al., 2006). Because research supports the need to tailor interventions to specific cultures, including sexual orientation, and gender, it could also be successful in the college-culture to utilize popular opinion leaders (POL's). This type of intervention might be very useful in influencing optimistic bias and peer norms. Recruiting influential students from a variety of social networks (both males and females) would be the first step in the process. Each student would go through training with professionals not only regarding HIV topics such as the benefits of using condoms, but also about the spread of the disease and facts about vaccines, and practice discussions with other leaders. The goal for the trainees would be such that each POL would fully understand the impact of HIV, how to prevent it and how having discussions with friends about HIV and condom use is a positive and maybe even "cool" thing. Utilizing POL's could make discussing HIV and condoms more mainstream and less of a teacher-student hierarchical dyad because the information would be coming from students with established relationships and commonalities and trust. Furthermore, an important component of this type of intervention that would target optimistic bias, would be to train the POL's to talk about their own sexual experience. For example, previous studies regarding self-positivity bias highlights the need to make other people's experiences more similar to one's own (Raghubir & Menon, 1998). Thus, a POL that only sometimes used condoms (like most students in the current study), could talk about how he also believed he was invincible to contracting HIV, but now understands that HIV can happen to anyone, and how he now uses condoms and how it might make him feel more empowered, or whatever the positive emotion he might have from the

experience. Lastly, an added benefit from using the POL method could be recruiting POL's that were not using condoms, were possibly even struggling in other ways in school, (e.g., discipline problems) and gave them a role in which they felt important, needed and competent. This type of student could be very influential in certain groups and even gain self-esteem and impact others that might be struggling in similar ways (especially since HIV/AIDS tends to impact people with other struggles).

Another topic that merits discussion is the idea that college campuses, especially diverse urban universities are very different from communities. Maybe, not separating ethnic groups on college campuses is a better way to model interventions. Separation of groups could foster segregation and possible negative racial attitudes towards high risk groups (e.g., African American females). Instead of assuming that a specific ethnic group adheres to cultural norms, the POL method can target a myriad of group leaders that could connect with several different ethnicities in one social group that share other commonalities besides race. Meaning, the college campus milieu in this generation is more complex, interracial, diverse, integrated, and thus connected by things other than race/ethnicity (e.g., music interests, sports, sexual orientation).

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Appendix A

Pan-Acculturation Scale

Everyone belongs to one cultural or ethnic group. Examples of cultural groups include: Mexican American, Irish, German, Chinese, and African American, among others.

Some people are a mixture of several cultural groups. When this is true, a person might find one cultural group more influential than another. Cultural and ethnic groups are important because they can influence our beliefs, traditions, and how we think, feel and act. These questions are about your ethnicity or your ethnic group and how you feel about it or react to it. What cultural group is important to you besides the American Cultural Group?

PAN0. My Important Cultural Group (besides American) is:

For the next series of statements please answer whether each of your individual characteristics is like the cultural group you identified above, the American Culture, both cultures or neither culture. Pick only one response for each item.

| My characteristics | My cultural group | American culture | Both | Neither |
|---|--------------------------|-------------------------|-------------|----------------|
| 1. My accent in my native language sounds like people from... | 1 | 2 | 3 | 4 |
| 2. My accent in English sounds like people from... | 1 | 2 | 3 | 4 |
| 3. I talk like people from... | 1 | 2 | 3 | 4 |
| 4. The words I use are from... | 1 | 2 | 3 | 4 |

| | | | | |
|---|---|---|---|---|
| 5. I am very proud of... | 1 | 2 | 3 | 4 |
| 6. I am excited about being a member of... | 1 | 2 | 3 | 4 |
| 7. I am very close or attached to... | 1 | 2 | 3 | 4 |
| 8. My best friends are from... | 1 | 2 | 3 | 4 |
| 9. The people I see every day are from... | 1 | 2 | 3 | 4 |
| 10. The people I hang out with are from... | 1 | 2 | 3 | 4 |
| 11. The foods I eat are from... | 1 | 2 | 3 | 4 |
| 12. The traditions I follow are from... | 1 | 2 | 3 | 4 |
| 13. The music I listen to is from... | 1 | 2 | 3 | 4 |
| 14. The celebrations I go to are from... | 1 | 2 | 3 | 4 |
| 15. My cultural values and beliefs are from... | 1 | 2 | 3 | 4 |
| 16. The culture I identify with the most is... | 1 | 2 | 3 | 4 |
| 17. The culture that influences the way and see things is from... | 1 | 2 | 3 | 4 |
| 18. My religion is from... | 1 | 2 | 3 | 4 |
| 19. My role models are from... | 1 | 2 | 3 | 4 |
| 20. My parents are from... | 1 | 2 | 3 | 4 |
| 21. My relatives are from... | 1 | 2 | 3 | 4 |
| 22. The people I like to be with are from... | 1 | 2 | 3 | 4 |
| 23. The people I go to school or work with are from... | 1 | 2 | 3 | 4 |

Appendix B

HIV Knowledge Scale

| | True | False |
|--|-------------|--------------|
| 1. A person can get HIV when using a condom during sexual intercourse. | T | F |
| 2. A person can get HIV when using birth control pills while having sexual intercourse. | T | F |
| 3. A woman can get HIV if the male withdraws before he ejaculates. | T | F |
| 4. A person can get HIV from deep kissing alone. | T | F |
| 5. Blood and semen are the only bodily fluids to transmit HIV | T | F |
| 6. A person can get HIV by having unprotected (no condom) oral sex. | T | F |
| 7. Recurrent vaginal yeast or cervical cancer may indicate HIV infection in women | T | F |
| 8. A person can get HIV from inserting his/her finger into someone's vagina. | T | F |
| 9. A person can get HIV from inserting his/her finger into someone's anus. | T | F |
| 10. A person can get HIV by sharing a razor blade with another person. | T | F |
| 11. A person can get HIV by sharing needles with others. | T | F |
| 12. HIV can be passed between two people when using sex toys. | T | F |
| 13. People who are HIV-positive are easy to pick out of a crowd even if they have not developed AIDS | T | F |
| 14. A person can get HIV by eating together with a person living with HIV. | T | F |
| 15. A person can get HIV by drinking together from same glass with a person living with HIV | T | F |

| | | |
|---|---|---|
| 16. A person can get HIV by hugging with a person living with HIV. | T | F |
| 17. Two women having sex together are not at risk of getting HIV. | T | F |
| 18. Only homosexuals need to worry about contracting HIV. | T | F |
| 19. A woman living with HIV can transmit HIV to her unborn child during pregnancy | T | F |
| 20. A woman living with HIV can give birth to a HIV negative baby | T | F |
| 21. During delivery, a woman living with HIV can infect her baby | T | F |
| 22. A woman living with HIV can infect her baby during breastfeeding. | T | F |
| 23. A person can get HIV from the process of having a tattoo. | T | F |
| 24. A person can get HIV from the process of having a body pierced | T | F |
| 25. Persons infected with HIV will likely develop antibodies within 6 months | T | F |
| 26. A person can get HIV kissing a person who has HIV on the cheek. | T | F |
| 27. HIV can be cured with traditional herbs and medicine. | T | F |

Appendix C

Self-positivity Bias

Instructions: Next, we want you to estimate the risk of contracting HIV/AIDS of a scale from 0 (*not at all*) to 100 (*very probable*) for the following people:

Yourself _____

Best Friend _____

Average undergraduate _____

Average person in the country _____

Appendix D

AIDS-related Stigma Scale

| | Agree | Disagree |
|---|--------------|-----------------|
| 1. People who have AIDS are dirty. | 1 | 2 |
| 2. People who have AIDS are cursed. | 1 | 2 |
| 3. People who have AIDS should be ashamed. | 1 | 2 |
| 4. It is safe for people who have AIDS to work with children | 1 | 2 |
| 5. People with AIDS must expect some restrictions on their freedom. | 1 | 2 |
| 6. A person with AIDS must have done something wrong and deserves to be punished. | 1 | 2 |
| 7. People who have HIV should be isolated. | 1 | 2 |
| 8. I do not want to be friends with someone who has AIDS | 1 | 2 |
| 9. People who have AIDS should not be allowed to work | 1 | 2 |

Appendix E

Perceived Risk for HIV

Instructions: For these next statements, please say whether you:

(1) Not at all sure (2) A little sure (3) Kind of sure (4) Fairly sure (5) Very sure

| | N ot at all sure | A little sure | K ind of sure | F airly sure | V ery sure |
|---|---|--|--|---|---------------------------------------|
| 1. I feel that I am at risk of getting AIDS at this time in my life. | 1 | 2 | 3 | 4 | 5 |
| 2. I sometimes think I may have been exposed to AIDS. | 1 | 2 | 3 | 4 | 5 |
| 3. I have had sex with someone who could have given me AIDS. | 1 | 2 | 3 | 4 | 5 |
| 4. One of my close friends does things that could lead to them getting AIDS. | 1 | 2 | 3 | 4 | 5 |
| 5. How sure are you that you have not been exposed to AIDS? | 1 | 2 | 3 | 4 | 5 |
| 6. How sure are you that sex partner(s) have NOT been exposed to AIDS? | 1 | 2 | 3 | 4 | 5 |
| 7. If you were to make a guess, how sure are you that you are at risk for getting HIV/AIDS at this time in your life? | 1 | 2 | 3 | 4 | 5 |

Appendix F

Peer Norm Scale

Instructions: For these next statements, please say whether you:

(1) Strongly Disagree (2) Disagree (3) Neutral (4) Agree (5) Strongly Agree

| | Strongly Disagree | Disagree | Neutral | Agree | Strongly Agree |
|---|--------------------------|-----------------|----------------|--------------|-----------------------|
| Monogamous relationships are no fun. | 1 | 2 | 3 | 4 | 5 |
| I mostly have sex for recreation. | 1 | 2 | 3 | 4 | 5 |
| Love is not necessary for sex. | 1 | 2 | 3 | 4 | 5 |
| Don't worry if partner looks respectable. | 1 | 2 | 3 | 4 | 5 |
| Feel uncomfortable asking partner's sex history. | 1 | 2 | 3 | 4 | 5 |
| My friends are not monogamous. | 1 | 2 | 3 | 4 | 5 |
| My friends show little concern for AIDS educations. | 1 | 2 | 3 | 4 | 5 |
| My friends don't know/practice safe sex. | 1 | 2 | 3 | 4 | 5 |
| Many of my friends mix drugs/alcohol/sex. | 1 | 2 | 3 | 4 | 5 |
| My friends don't think safe sex important. | 1 | 2 | 3 | 4 | 5 |

Appendix G

Risk Behavior: Sexual Behavior Survey

Instructions: This next section asks about sexual behaviors. Remember, your answers are private and will not be shared with anyone.

1. How many of your **friends** have had sexual intercourse?
 - None of my friends has had sexual intercourse → SKIP TO QUESTION #3
 - Less than half of them
 - About half of them
 - More than half of them
 - Almost all of them

2. Of those **friends** who have had sexual intercourse, how often do you think that most of them have used condoms?
 - None of my friends has had sexual intercourse
 - Always
 - More than half the time
 - About half the time
 - Less than half the time
 - Never

3. Do you want to have sexual intercourse during **the next year**?
 - Yes, definitely
 - Yes, probably
 - No, probably not
 - No, definitely not

4. How likely is it that you will have sexual intercourse during **the next year**?
 - Extremely likely
 - Very likely
 - Somewhat likely
 - Not very likely
 - Not at all likely

The next set of questions asks about sexual behaviors with ANY partner in your life. Please remember that all your answers are entirely confidential.

5. Have you ever had sexual intercourse?
 - Yes
 - No.....If no → SKIP TO NEXT SECTION.

6. How old were you when you had sexual intercourse for the **very first time**?
 - 13 years or younger

- 14 years
- 15 years
- 16 years
- 17 years
- 18 years
- 19 years
- 20 years
- 21 years or older

7. Did you and your partner use a condom **the very first time** that you had sexual intercourse?

- I have never had sexual intercourse
- Yes
- No

8. During your **whole life**, how many times have you had sexual intercourse?

- Not at all (zero times)
- 1 time
- 2 times
- 3-5 times
- 6-10 times
- 11-20 times
- More than 20 times

9. During your **whole life**, how often did you use condoms when you had sexual intercourse?

- I have never had sexual intercourse
- Always (always used a condom)
- More than half the time
- About half the time
- Less than half the time
- Never (never used a condom)

10. Number of **lifetime** sexual partners?

- 1 person
- 2 people
- 3 people
- 4 people
- 5 people
- 6 people or more

11. Total number (lifetime) of **unprotected** vaginal and anal sex?

- 0 - 10 times
- 10 - 20 times
- 20 - 30 times
- 30 - 40 times

- 40 - 50 times
 - More than 50 times
12. Total number (lifetime) of **protected** vaginal and anal sex?
- 0 - 10 times
 - 10 - 20 times
 - 20 - 30 times
 - 30 - 40 times
 - 40 - 50 times
 - More than 50 times
13. During the **past 3 months**, with how many people did you have sexual intercourse?
- I have had sexual intercourse, but not during the past 3 months
 - 1 person
 - 2 people
 - 3 people
 - 4 people
 - 5 people
 - 6 people or more
14. During the **past 3 months**, how many times did you have sexual intercourse?
- Not at all (zero times)
 - 1 time
 - 2 times
 - 3-5 times
 - 6-10 times
 - 11-20 times
 - More than 20 times
15. During the **past 3 months**, how often did you use condoms when you had sexual intercourse?
- I have not had sexual intercourse in the past 3 months
 - Always (always used a condom)
 - More than half the time
 - About half the time
 - Less than half the time
 - Never (never used a condom)
16. Did you drink alcohol or use drugs before you had sexual intercourse the **last time**?
- Yes
 - No
17. Did you or your partner use any method of birth control the **last time** you had sexual intercourse?

- No
- Yes

18. The **last time** you had sexual intercourse, what method(s) did you or your partner use to **prevent pregnancy**? Check all that apply.

- I have never had sexual intercourse
- No method was used to prevent pregnancy
- Birth control pills
- Condoms
- Depo-Provera (injectable birth control)
- Withdrawal
- Some other method
- Not sure

19. The **last time** you had sexual intercourse, what method(s) did you or your partner use to protect yourself from a **sexually transmitted disease**, such as HIV? Check all that apply.

- I have never had sexual intercourse
- No method was used for protection
- Birth control pills
- Condoms
- Depo-Provera (injectable birth control)
- Withdrawal
- Some other method
- Not sure

20. Thinking of all the times you have had sexual intercourse, about what proportion of the time have you or your partner used a condom?

- None of the time
- Some of the time
- Half of the time
- Most of the time }
- All of the time
- Don't know

Appendix H

Socio-demographic comparison

Semester

| | <u>Fall</u> | | <u>Spring</u> | | <i>F</i> | <i>d</i> |
|----------------------|-------------|-----------|---------------|-----------|----------|----------|
| | <i>M</i> | <i>SD</i> | <i>M</i> | <i>SD</i> | | |
| Sexual Knowledge | 5.85 | 1.40 | 7.03 | 1.54 | 44.53 | .000 |
| Self-positivity Bias | 28.03 | 20.55 | 22.72 | 20.20 | 4.81 | .029 |
| HIV/AIDS Stigma | 10.37 | 1.55 | 10.26 | 1.50 | 0.37 | .54 |
| Peer Norms | 25.56 | 6.23 | 24.13 | 5.14 | 2.67 | .10 |
| Perceived Risk | 13.22 | 4.79 | 12.65 | 4.59 | 1.03 | .31 |

Gender

| | <u>Male</u> | | <u>Female</u> | | <i>F</i> | <i>d</i> |
|----------------------|-------------|-----------|---------------|-----------|----------|----------|
| | <i>M</i> | <i>SD</i> | <i>M</i> | <i>SD</i> | | |
| HIV/AIDS Stigma | 10.75 | 1.93 | 10.13 | 1.30 | 9.30 | .003 |
| Peer Norms | 26.64 | 5.06 | 23.86 | 5.76 | 13.88 | .000 |
| Self-positivity Bias | 20.38 | 20.12 | 27.59 | 20.57 | 6.92 | .009 |
| Perceived Risk | 12.36 | 4.37 | 13.18 | 4.83 | 1.67 | .19 |
| Sexual Knowledge | 6.45 | 1.56 | 6.43 | 1.60 | 0.09 | .90 |

Race/Ethnicity

| | <u>Other</u> | | <u>White</u> | | <i>F</i> | <i>d</i> |
|----------------------|--------------|-----------|--------------|-----------|----------|----------|
| | <i>M</i> | <i>SD</i> | <i>M</i> | <i>SD</i> | | |
| Peer Norms | 23.64 | 5.56 | 25.33 | 5.66 | 5.54 | .019 |
| Sexual Knowledge | 6.28 | 1.58 | 6.51 | 1.59 | 1.34 | .25 |
| Self-positivity Bias | 25.57 | 23.05 | 24.40 | 19.28 | 1.45 | .23 |
| Perceived Risk | 13.46 | 4.90 | 12.63 | 4.56 | 1.91 | .17 |
| HIV/AIDS Stigma | 10.34 | 1.47 | 10.28 | 1.56 | 0.08 | .77 |

Race/Ethnicity

| | <u>Other</u> | | <u>African American</u> | | <i>F</i> | <i>d</i> |
|----------------------|--------------|-----------|-------------------------|-----------|----------|----------|
| | <i>M</i> | <i>SD</i> | <i>M</i> | <i>SD</i> | | |
| Peer Norms | 25.15 | 5.67 | 22.71 | 5.28 | 7.10 | .008 |
| Perceived Risk | 12.54 | 4.39 | 14.82 | 5.65 | 9.20 | .003 |
| HIV/AIDS Stigma | 10.33 | 1.55 | 10.18 | 1.42 | .37 | .55 |
| Sexual Knowledge | 6.50 | 1.59 | 6.11 | 1.56 | 1.56 | .14 |
| Self-positivity Bias | 25.07 | 20.02 | 27.67 | 23.87 | .59 | .44 |

Romantic Relationship

| | <u>Yes</u> | | <u>No</u> | | <i>F</i> | <i>d</i> |
|----------------------|------------|-----------|-----------|-----------|----------|----------|
| | <i>M</i> | <i>SD</i> | <i>M</i> | <i>SD</i> | | |
| Peer Norms | 24.03 | 5.68 | 25.82 | 5.68 | 6.11 | .014 |
| Perceived Risk | 11.97 | 4.22 | 14.66 | 5.08 | 21.78 | .000 |
| Self-positivity Bias | 26.75 | 19.10 | 23.00 | 22.53 | 2.01 | .15 |
| HIV/AIDS Stigma | 10.35 | 1.60 | 10.26 | 1.42 | .207 | .65 |
| Sexual Knowledge | 6.57 | 1.61 | 6.21 | 1.52 | 3.29 | .07 |

Vita

Molly R. Neff was born on September 24, 1975, in Houston, Texas. She graduated from St. John's High School in 1994. She received her Bachelor of Arts in Spanish from the College of William and Mary, Williamsburg, VA, in 1999. Prior to beginning the Ph.D. program at Virginia Commonwealth University, Molly taught high school Spanish and coached various teams such as field hockey, basketball, and squash. She also participated in project INTUIT as a research assistant with Dr. Victoria Shivy. She received a Masters in Science (part of the Ph.D. program) from Virginia Commonwealth University in 2008. She resides in Houston with her husband and two kids.