PERCEIVED RISK, DECISIONAL BALANCE, AND HIV TESTING PRACTICES IN COLLEGE STUDENTS

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Previous research has found that college students widely participate in HIV risk behaviors, including inconsistent or lack of condom use, multiple sex partners, and sexual activities while under the influence of alcohol. However, most college students do not perceive themselves at risk for HIV and further, the majority of college students have never been tested for HIV. In an effort to understand the reasons undergraduate students may choose or not choose to get tested for HIV, and elucidate possible points for public health intervention, a survey was administered to undergraduate students at the University of Pittsburgh.

Survey data was collected from 440 University of Pittsburgh undergraduate students on the pros and cons of HIV testing, their perceived risk for HIV as well as the number of times they had ever been tested. Chi-square tests were used to determine the relationship between decisional balance items and HIV testing as well as perceived risk and HIV testing. One-way ANOVA was used to determine any association between HIV testing and demographic variables.

This study found that only 11.8% of students had ever received an HIV test. The likelihood of testing increased with age, while gender and ethnicity were not significant predictors of HIV testing. Students with high perceived risk were significantly more likely to have received an HIV test in their lifetime. Additionally, decisional balance items around the topics of "security and responsibility" and "fear of needles" were also found to be significant with HIV testing.

The low rate of HIV testing in undergraduate college students is of great public health concern given the high prevalence of risk behaviors in this population. Students who participate in risk behaviors and are not tested for HIV limit their own ability to take advantage of efficacious treatments and put sex or drug partners at risk for contracting the virus. Research that helps uncover the behavioral determinants of HIV testing in the college student population and reveals potential points of intervention is of great public health significance.

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1.0   INTRODUCTION

An estimated 47% of the adult U.S. population says they have ever been tested for HIV (Views and Experiences with HIV Testing in the U.S. 2009), however, up to 25% of Americans who are HIV positive do not know their status (CDC HIV Testing 2008). HIV testing is an essential component of prevention, treatment and care efforts and is an integral part of curbing the spread of the HIV/AIDS epidemic. In 2006, the CDC began recommending non-risk based, routine HIV testing for individuals between the ages of 13 and 64 (Branson et al. 2006). Despite scaling up testing recommendations, the CDC has not seen an increase in the proportion of non-elderly adults who report having been tested for HIV in the past 12 months (Views and Experiences with HIV Testing in the U.S. 2009). Individuals with an unknown positive HIV status limit their own ability to take advantage of new and efficacious therapies and put their sex or drug-use partners as risk (CDC HIV Testing 2008).

Cohort studies have found that individuals who are tested for HIV and subsequently receive a positive test decrease behaviors that may transmit HIV to other uninfected individuals (Cleary et al. 1991). Conversely, research shows that HIV positive individuals who are unaware of their status will continue to engage in high-risk behaviors, putting uninfected individuals at a higher risk of contracting the virus (Wenger et al. 1994).

In 2006 alone, there were almost 56,300 new diagnosed cases of HIV in the U.S. (HIV/AIDS in the United States 2009), with the largest number of new HIV infections occurring

in individuals ages 13-29. While the exact number of new infections every year is unknown as a result of incomplete surveillance and low testing rates, the CDC estimates that approximately 20,000 individuals aged 13-24 are infected with HIV every year (White House Press Office 2000). Further, the viral properties of HIV/AIDS make it such that healthy individuals may not produce symptoms for an extended period of time, on average, approximately seven years. The majority of AIDS diagnoses have occurred in individuals aged 30-39 (see *Figure 1*). However, due to the latency period of the HIV virus, it is estimated that many adults who are diagnosed with HIV/AIDS in their 30's may have been infected during their college years (Carroll 1991).
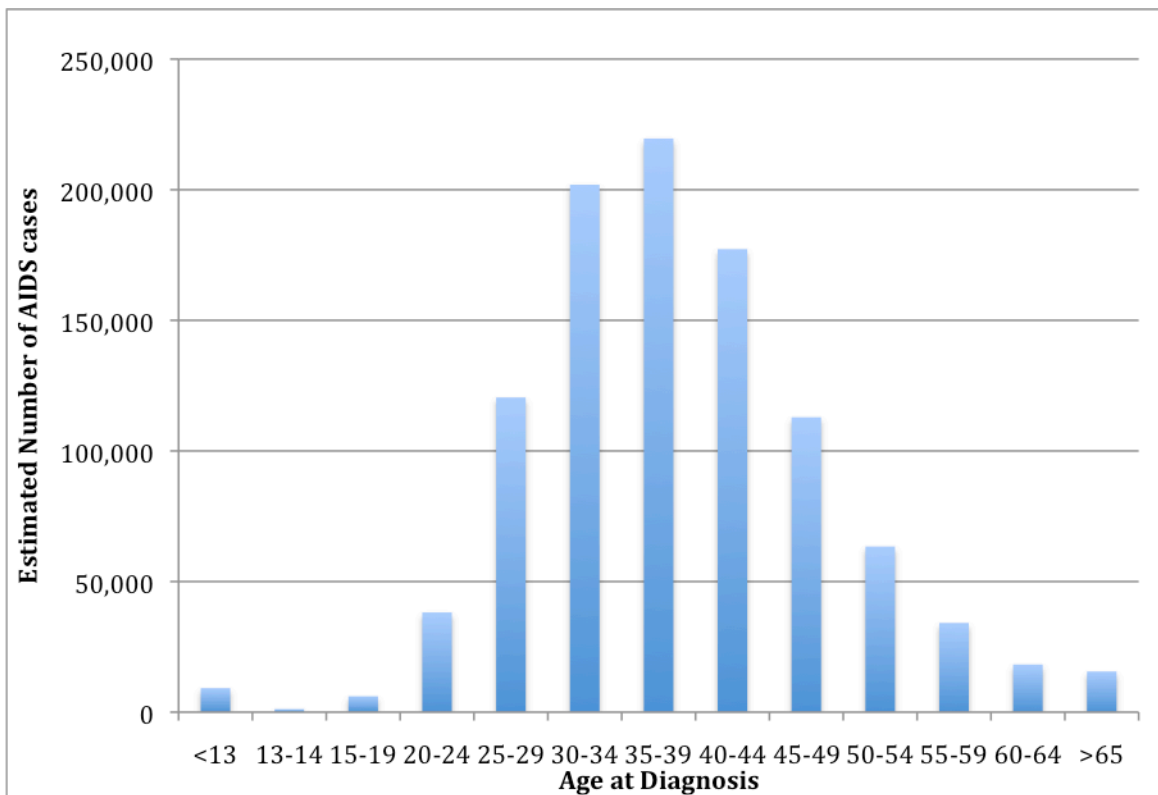
Figure 1. Number of AIDS cases reported to the CDC through 2007 (CDC HIV/AIDS Surveillance Report, 2006)

In addition to an increasing number of HIV infections in adolescents and young adults in recent years, a survey from 2006 suggests that trends for HIV testing in 18-29 year olds are inconsistent year to year and remain low overall. Only between 26-35% of 18-29 year olds say they have been tested within the past 12 months (Survey Brief: Views and Experiences with HIV Testing in the U.S 2009).

While some at-risk groups do not pursue HIV/AIDS testing because they do not understand associated risk factors, college students have previously been found to be knowledgeable about transmission routes and protection methods (Opt and Loffredo 2004; Shapiro et al. 1999; Mickler 1993). While it is suggested that most college students consider themselves at low risk of contracting HIV (Lewis et al. 2009), this cross-section of the population also regularly engages in high-risk behavior, including multiple sex partners, inconsistent or lack of condom use, as well as sexual activity while under the influence of alcohol and/or drugs (Lewis et al. 2009). The high percentage of college students engaging in high-risk sex behaviors (>40%) suggests that this population should be undergoing regular HIV testing (Anastasi et al. 1999).

The purpose of this research was to explore the pros and cons (decisional balance) of HIV testing according to college students, to further assess their self-perceived risk for HIV and assess if this student population has been tested for HIV. Using established scales based in theoretical constructs, surveys were administered to undergraduate students from the University of Pittsburgh to gather data on HIV testing behavior, their perceptions of personal risk and reasons to get tested. Investigating decisional balance in the context of HIV testing may provide insight on how to appropriately frame messages about HIV testing to college students and will further explore how risk and HIV testing may be correlated, filling existing gaps in the literature.

2.0   LITERATURE REVIEW

2.1   COLLEGE STUDENTS AND HIV/AIDS

College students are a group often overlooked in the discussion on high-risk populations for HIV. In fact, many individuals assume university populations are at a much lower risk for HIV than the general population based on data collected from 19 universities in 1990 that estimates prevalence at 1 in 500 students (Gayle et al. 1990). The CDC estimates the prevalence in the general population at 1 in 250 (CDC HIV Prevalence Estimates 2008). While this statistic brings to light the need for updated prevalence estimates in college students, it is also essential to consider the epidemic in the context of current trends of HIV risk-behavior in college students. The literature repeatedly suggests that a high percentage of college students are engaging in HIV high-risk behavior (Polacek et al. 2007; Opt et al. 2004; Lewis et al. 2009; Baldwin & Baldwin 1988; Svenson et al. 1997). In addition "…college students have a belief in personal immortality—behaviors which later in life may lead to disease and disability are viewed with skepticism. Also, the lack of immediate signs and symptoms of HIV infection, due to its latency period, can cause many college students to mistakenly believe that they are immune to HIV" (Ragon 1995).

It is estimated that between 75% and 90% of college students are sexually active, with students reporting an average of 2 sex partners per year, leading to an average of 6 or more

partners in their lifetime. When asked about condom use, only about 50% of students said they had used them within the last 30 days when participating in vaginal sex. The numbers are startlingly fewer for oral and anal intercourse (ACHA 2006; ACHA 2007). Further, a 2002 HIV outbreak among college men in the Southeastern United States has sparked questions about previously estimated HIV prevalence rates in college populations (Polacek et al. 2007). Recent studies report a significantly higher rate of HIV spreading among college men in the Southeastern United States than what would be expected (Hightow et al 2005). The literature detailing this multi-campus epidemic found that the sudden increase in HIV cases in North Carolina had gone unrecognized for almost four years, perhaps in part because college students have not been previously acknowledged as a group responsible for emerging HIV infections (Hightow et al. 2005). This new information highlights the necessity of updated prevalence research, the need for regular HIV testing and the powerful nature of sexual networks on college campuses, which allows HIV to move quickly among these groups (Hightow 2005).

The CDC has identified that risk-based testing is not the most effective strategy for identifying individuals with HIV. Many groups, including college students, may not perceive themselves at risk for the virus, and therefore, would not seek out a test. The CDC's recommended health-care setting based testing would provide a way to increase diagnosis of HIV while also decreasing stigma associated with the HIV test by screening all individuals routinely for the virus (Branson et al. 2006).

While universal testing is a gold standard, it is especially important that individuals in high-risk populations receive regular HIV screening. The general college student population can be placed in a "risky" category based of their wide participation in high HIV-risk behaviors: inconsistent condom use, multiple sexual partners and participating in sexual activity while

under the influence of drugs and/or alcohol (Polacek et al. 2007; Opt et al. 2004; Lewis et al. 2009; Baldwin and Baldwin 1988; Svenson et al. 1997). Further complicating issues of HIV risk behavior in college students is research that suggests students are very knowledgeable about HIV transmission and protection methods. So, while the link between knowledge and risk-reduction behavior will be explored later in this paper, it can be suggested that HIV testing becomes substantially more important if educational interventions and knowledge have not been successful in decreasing the HIV high-risk behavior of college students (Lance 2001). Thus, understanding the pros and cons of testing in the eyes of college students may reveal how HIV screening can be more effectively scaled up in this population, enhancing preventive health behavior from an angle previously underutilized.

Exploring the risky behaviors and lifestyle choices often exhibited by college students will aide in the understanding of HIV testing in this at risk population. Through an investigation of these behaviors, the necessity of testing in college students becomes apparent.

2.1.1   Risky Sexual Behavior in College Students

Patterns of risky sexual behavior in college students increase their likelihood of contracting HIV (Anastasi et al. 1999). University students are generally at an "early stage of sexual behavior" which suggests they will change partners more frequently (Svenson et al. 1997) and that their sexual behaviors are poorly managed (Cooper 2002).

For students who are not abstinent, condom use is the most effective way to reduce HIV transmission (Lewis et al. 2009). However, college students have been found to use condoms very inconsistently (Lewis & Malow 1997; Strader & Beaman 1989; DiClemente et al. 1990). The largest self-report study on college sex-behavior conducted in 2006 by the American

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College Health Association involved 34 universities and almost 24,000 students. It revealed that in the previous 30 days over 43% of students had participated in oral sex, 46% had vaginal intercourse and just over 4% had engaged in anal sex. Of these numbers, only 4% who participated in oral sex used a condom, 54% used a condom during vaginal intercourse and 26% during anal sex (Lewis et al. 2009). The staggering statistics of condom non-usage have also been reported by Opt and Loffredo (2004) who found that only half of students stating concern about HIV infection use condoms 100% of the time, and further only 35% of students who are sexually-active always practice sex with a condom.

Inconsistent condom use has also been looked at in the context of perceived disadvantages of use. These studies have reported that college students cite inconvenience, embarrassment and reduced pleasure during sexual activity as reasons *not* to use condoms. Barriers to obtaining condoms has also been highlighted as a reason for non-usage (Basen-Engquist 1992; Thompson et al. 1996; Lollis et al. 1997; Sheeran et al. 1999; Wendt et al. 1995).

In addition to focusing primarily on the cons of condom use, it has also been shown that college students weigh the benefits of unprotected sex more heavily than the costs (Siegel 1994; Parsons 1997). Perceptions of positive outcomes associated with unprotected sex were predictive of risky sexual behavior (Parsons et al. 2000). Researchers hypothesize that the focus on benefits of unprotected sex may be due to "adolescent egocentrism" (Elkind 1967) and their inexperience in dealing with the costs of risky sexual behavior, including HIV (Moore et al. 1996).

While inconsistent condom use contributes to the HIV-risk status of college students, patterns of multiple sexual partners also increase HIV risk in this population. Having multiple sex partners increases the risk of transmission of HIV and other STI's (Levinson et al. 1995), and young adults are more likely than any other age group to engage in sexual acts with multiple

partners (Apostolopoulos et al. 2002). Multiple partners and sexual permissiveness has become the norm on college campuses (Chng & Moore 1994), thus, sexual risk-behavior has been increasing. As stated previously, it is estimated that between 75% and 90% of college students are sexually active, with students reporting an average of 2 sex partners per year, leading to an average of 6 or more partners in their lifetime (Lewis et al. 2009). Although estimates differ among cross-sectional studies, Reinish et al. (1995) suggest that for college men, the mean number of lifetime partners may be eight. Number of sexual partners may also be associated with ethnicity, as African American males have been more likely to report a larger number of sexual partners compared to other ethnic groups (DiIorio 1998; Belcastro 1985). Overall, more than 75% of sexually active college students will report multiple lifetime partners (Chng & Moore 1994; DiClemente et al. 1990). With low rates of consistent condom use among this population (Bazargan 2000) and multiple lifetime sexual partners, college students are at an increased risk for contracting HIV.

2.1.2   Alcohol, Drug Use and HIV Risk Behavior

Substance abuse coupled with sexual activity is an additional reason that college students are considered at a higher risk for contracting HIV (Gullette & Lyons 2005). While alcohol and drug abuse itself are not direct HIV-risk behaviors, their effect on sexual decisional making causes substance abuse behavior concomitant to sex to be labeled as an HIV-risk practice (Lewis et al. 2009). The American College Health Association estimates that 15% of college students who drank alcohol had unprotected sex while 30% of students report drinking prior to sexual activity (Brown and Vanable 2007). This amounts to almost 400,000 college students engaging in unprotected sex after alcohol consumption per year (Hingson et al. 2002).

College students who drink alcohol are limited in their attention to "distal inhibitory cues" such as HIV or other STI's, and their focus is turned to the most significant factors of the present sexual circumstance, such as increased pleasure of sex without a condom (MacDonald, MacDonald, Zanna, & Fong, 2000). Since drinking is a primary social outlet for college students (Brown and Vanable 2007), it provides an opportunity for these individuals to acquire new sexual partners, many of whom will have unknown or undisclosed sexual histories (Brown 1998). Brown and Vanable found a significant relationship between drinking and unprotected sex with a non-steady partner: 47% of students who engaged in unprotected vaginal sex (UVS) drank alcohol prior to sexual activity, while only 17% of students engaged in UVS not under the influence of alcohol. Overall, alcohol consumption is most likely to affect the non-use of condoms between casual partners (Brown and Vanable 2007; LaBrie et al. 2005), also increasing the risk of HIV transmission.

Further research comparing two college cohorts in 1990 and 2005 may reveal some trends of risky behavior in college students over time (Teague 2009). Higher rates of oral and anal sex were reported in the 2005 sample while drug use had also significantly increased over time. Despite increases in risky behavior seen over time, the study also found that both the 1990 and 2005 cohort considered their HIV risk low, bringing to light questions of self-serving cognition and the "illusion of invulnerability" which allows college students to distort and minimize perceptions of HIV risk (Teague 2009).

2.1.3   HIV Knowledge

HIV knowledge in college students has been rigorously explored in the literature (Shapiro et al. 1999; Bazargan 2000; Opt et al. 2004). Lewis, Miguez & Malow (2009), in an examination

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of published research, report that in general, college students are very knowledgeable about HIV yet still practice high-risk behaviors (Lewis et al. 2009; Shapiro et al. 1999). Despite the low percentage of college students using condoms during sexual activity, studies exploring knowledge of condom use for prevention of HIV transmission show that 86% of college students responded positively when asked if having sexual intercourse without a condom increases a person's risk of becoming infected with HIV/AIDS (Opt and Loffredo 2004). Additionally, 82% of students knew that unprotected oral sex can lead to infection with HIV (Opt and Loffredo 2004). One study even suggests that increased knowledge of HIV may increase the likelihood of risky sexual behavior, as increased knowledge may be related to decreased concern about HIV and therefore, less frequent condom use during sexual acts (Demmer and Caroleo 2001).

Among African-American college students, researchers have hypothesized that a "knowledge-behavior gap" exists, suggesting that HIV knowledge does not lead to condom use. One study found that only 20% of unmarried, sexually active African American college students always used condoms during sexual activities despite 65% of the sample correctly answering items related to transmission of HIV (Bazargan 2000). Similar findings regarding knowledge and condom use are seen in the studies involving cross-cultural samples (Baldwin and Baldwin 1988; Freimuth et al. 1987; Gray and Saracino 1989). When compared by Baldwin and Baldwin, heterosexual college students who possessed accurate HIV knowledge were *not* more likely to use condoms during sexual activities than those who had limited knowledge. Further, Freimuth et al. (1987) and Gray et al. (1989) found no relationship between knowledge of HIV and exhibiting safe sex behavior.

Despite overall high levels of HIV knowledge, many studies suggest there remain caveats in college students' understanding of HIV. In a sample of heterosexual college students, 34%

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were uncertain about transmission routes such as sharing eating utensils, while 17% believed HIV could be passed from one individual to another by kissing without the exchange of saliva (Loos and Bowd 1989). In their study of African American college students, Bazargan et al. found that 15% of sexually active students believed having sex without a condom was not likely to cause HIV infection if the penis was removed prior to ejaculation (1989). The same study also found that nearly 30% of African American students believed oral sex would not transmit HIV if ejaculate was not swallowed (Bazargan et al. 1989). Misconceptions may contribute to continued risky behavior (Svenson et al. 1997).

Misconceptions about HIV have been found to go down as education level increases, including myths about transmission by kissing, sharing a glass of water or touching a toilet seat. Individuals with some high school or college-level education hold more misconceptions about HIV transmission than college graduates (Spotlight: The Public's Knowledge and Perceptions About HIV/AIDS 2006). Despite the fact that college students hold fewer misconceptions about HIV transmission than other groups and are knowledgeable about prevention methods, they still perform behaviors that put them at increased risk for HIV (Spotlight: The Public's Knowledge and Perceptions About HIV/AIDS 2006).

While there remain gaps in college students' knowledge of HIV/AIDS, they are generally well informed about prevention and transmission of the virus. If increasing knowledge does not lead to a reduction in HIV risk-behaviors, other, more efficacious interventions should be pursued.

2.1.4 Attitudes Toward HIV Testing

In understanding testing behavior among college students, it is important to first explore existing literature regarding attitudes about receiving an HIV/AIDS test. A 1999 study done by Boshamer and Bruce is the most comprehensive study looking at attitudes about HIV antibody testing in heterosexual college students. The instrument developed, known as the HIV-Antibody Testing Attitude Scale (HTAS), is a 32 item instrument with Likert scale responses. The goal of the study was to better understand college students' attitudes towards HIV testing in order to design effective intervention and prevention programs (Boshamer and Bruce 1999). The scale found four primary factors influence testing attitudes: concerns about how HIV testing would be perceived by friends, perceptions of familial concerns with one's decision to receive an HIV test, concern about the public opinion of HIV testing, and uncertainty about the confidentiality of testing. The results of the study suggest that HIV antibody testing is a "risk reduction behavior that involves a different decision-making process that is unrelated, at least temporally, to one's sexual behavior" (Boshamer and Bruce 1999). Their data did not correlate feelings of susceptibility to HIV and the likelihood of HIV antibody testing. Unlike other studies looking at knowledge and HIV testing, Boshamer and Bruce found that perceived knowledge of HIV/AIDS was significantly correlated to the HTAS score. They suggest that this may indicate that those who are knowledgeable about HIV/AIDS are more likely to understand the importance of protecting oneself and knowing their serostatus. Thus, Boshamer and Bruce (1999) suggest that if those most likely to test for HIV/AIDS are more knowledgeable about the epidemic, then university-aimed prevention programs should include education about HIV as a means to increase testing rates.

While Boshamer and Bruce's (1999) HTAS instrument provides a valuable tool which can be used to explore attitudinal influences of HIV testing, it does not allow for the more in-depth investigation of what factors make-up these positive and negative perceptions of HIV testing. This highlights a gap in the current literature and the need for further investigation of the pros and cons of testing according to college students.

2.1.5 Perceived Risk for HIV

Personal estimations of risk are important to understand when considering why an individual would engage in a protective health-related behavior (Prochaska 1990). The literature shows inconsistent relationships between college students' perceived risk for HIV and adopting risk reduction behaviors (Lewis and Mallow 1997). While most students are aware that the college population is at risk for HIV, only a small percentage feels personally at risk. Studies suggest that only 15-25% of students would consider themselves at risk for HIV (McCormack 1997; Bustamante 1992) despite research that shows a significantly larger percentage of college students engage in HIV risk-behaviors (Teague 2009, Brown & Vanable 2007; Lewis et al. 2009).

An in-depth, qualitative study suggests that many students believe the "college environment" is not affected by HIV, and thus potential sex partners would also be HIV negative (Manning et al 1989; Kusseling et al. 1996). Additional comments about perceived susceptibility included "students here come from good backgrounds, so they won't get AIDS" and "we're young and rich" suggesting that age and socioeconomic status provides protection against HIV (Kusseling et al. 1996). These feelings of insusceptibility provide some insight into the high prevalence of HIV-risk behaviors seen within the college student population.

In addition to a sense of false security within the college environment, students have also been known to believe in invincibility, which allows them to downplay the risk of their own actions and adopt an attitude of "I don't have to worry about HIV/AIDS" (Teague 2009). While the roots of "invincibility fable" can be traced back to psychological theory, research has also suggested that perceived HIV risk may be linked to identification with groups in which HIV was originally predominant: homosexual men and intravenous drug users. Despite the spread of HIV across and within communities, individuals that do not identify with one of the original high-risk groups may perceive their HIV risk as minimal, regardless of participation in HIV high-risk behaviors (Mickler 1993).

Across the literature, studies have shown that college students perceive themselves as much less vulnerable to HIV than their friends or individuals in their larger university peer-group (Brown 1998; Mickler 1993), suggesting there is some acknowledgement of susceptibility to HIV, but not necessarily when assessing personal risk (Brown 1998). Self-perception of risk is generally ranked low, while a friend's risk is perceived as slightly higher, and perceived risk for individuals in their peer group is higher still (Brown 1998). Interestingly, students ranked HIV risk in their peers as higher than their own, despite risk behaviors between the two groups being extremely similar (Brown 1997). Despite believing their peer's HIV risk is higher than their own, students have cited "not being in a high risk group" as a reason not to seek HIV testing (Bernard & Prince 1998). Overall, students have been found to perceive their risk for HIV as low, despite years of research that suggests HIV is increasing in young, susceptible populations and that students practice behaviors associated with significantly heightened risk for HIV infection (Brown 1998).

2.2 THEORY

Behavioral theorists suggest that perception is an important component in an individual's decision to perform a health-related behavior (Glanz 2008) and is a key concept in individual-level theories including the health belief model and the concept of decisional balance, which assesses the pros and cons of performing a health-related behavior. The survey administered in this study is based on theoretical concepts of perception which will be further explored to better understand the role perception plays in shaping health behaviors.

2.2.1 The Health Belief Model

The Health Belief Model (HBM) is based in psychological theory and is considered a value-expectancy theory. In translating concepts of value-expectancy to health behaviors, value became the desire to avoid illness and expectancy was translated as the belief that a certain health action or decision available to an individual would prevent illness (Rosenstock et al. 1994; Glanz et al. 2008). The theory was originally developed in the 1950's by the U.S. Public Health Service to try and understand the "widespread failure of people to accept disease preventives or screening tests for the early detection of asymptomatic disease" (Rosenstock 1974). Since that time, researchers have worked to refine and expand the model so that it encompasses all preventive health behaviors and it has been applied to a wide variety of health topics including influenza vaccination, seat belt use, and medication compliance (Janz and Becker 1984).

Today it is generally believed that if an individual perceives that he/she is susceptible to a disease condition then they will take action to screen, prevent, or control the condition (Rosenstock et al. 1994). Taking action against a certain condition is also related to the

anticipated benefits (pros) and costs (cons) of performing the behavior (Rosenstock et al. 1994). Weighing the pros and cons of health-related behaviors will be discussed later in this paper within the context of decisional balance.

The current version of the HBM consists of four primary components: Perceived susceptibility, perceived severity, perceived benefits and perceived barriers. The survey instrument used in this study was based primarily on the "perceived susceptibility" construct of HBM and has been defined as an individual's "subjective perception of the risk of contracting a health condition" (Rosenstock et al. 1994). The model is predicated on the notion that individuals highly value their health or achieving health is an important goal (Janz and Becker 1984). The HBM has served as a valuable organizational framework over the last 35 years in understanding, explaining, and predicting an individual's acceptance and performance of certain health behaviors (Janz and Becker 1984).

While the Health Belief Model has been a useful tool in understanding individual-level behaviors, the model is based in cognitive theory and does not take into account the role of emotion in shaping behavior (Glanz 2008). Additionally, the model does not account for environmental factors that are known to influence health behaviors (Behavior Change 2004). Finally, this model is based on assumptions that individuals make conscious decisions and that control over behaviors lies in the individual.

2.2.2 Decisional Balance

Decisional Balance was originally proposed by Janis and Mann (1977) as a conflict model, using a decisional "balance sheet" that takes into account anticipated gains and losses (or pros and cons) of a particular decision or behavior. Historically, this "balance sheet" has

included individual decision making while also taking into account an individual's reference group. The gains and losses in a balance sheet can be generally categorized into four types of decisional consequences: functional gains or losses to self, functional gains or losses to significant others, approval or disapproval from reference group, and an individual's own self-approval or disapproval (Hoyt and Janis 1975). The "balance sheet" represents the optimal consideration of positive and negative aspects of a particular decision and is often used as a tool to help individuals thoroughly consider all ramifications prior to decision-making (Hoyt and Janis 1975). In 1985, Velicer et al. proposed that the constructs of the decisional balance model could be effectively combined with the stages of change model and suggested that in reality, there are only two factors that need to be considered when making a decision: the pros and cons. This is different than the eight factors considered by Janis and Mann in their original model (Prochaska 1994). A decisional balance sheet as it relates to HIV testing would include the components listed below:

	PROS	CONS
Taking an HIV test		
Not taking an HIV test		

Figure 2. Decisional balance sheet for HIV testing

Decisional balance has been used to understand the adoption of health behaviors across a wide variety of topics including condom use and mammography screening. Prochaska et al.

(1994) found that decisional balance scales are a valuable predictive tool and greatly simplify the eight decisional categories originally proposed by Janis and Mann (1977) in the Transtheoretical Model.

In choosing to take an HIV test, Lauby et al. suggest that an individual's perceived susceptibility (risk) for HIV may influence the decision to be tested, in combination with the perceived pros and cons of receiving an HIV test, in the context of decisional balance. The survey instrument, whose development is detailed in the methods section, was based on theoretical concepts of perception based in the health belief model and decisional balance.

3.0   OBJECTIVES AND HYPOTHESES

A comprehensive review of the literature suggests that college students are at risk for HIV and should undergo regular testing as a component of responsible disease prevention behavior (Lewis et al. 2009). While past studies have explored some factors related to HIV risk perception, the idea of decisional balance has never been applied to HIV testing behavior in college students.

College students have been found to be knowledgeable about HIV, yet their knowledge does not result in risk-reduction behavior (Shapiro et al. 1999; Lance 2001; Joseph-son 1999). Students still frequently engage in unprotected sex with multiple partners and even believe they have the ability to choose "HIV free" partners based on unreliable estimates of risk, like physical attractiveness or "just knowing" (Agocha and Cooper 1999; Keller 1993). Most HIV risk-reduction and testing interventions have focused on educational interventions, despite research that suggests knowledge does not lead to a decrease in HIV risk-behavior. If high levels of risky behavior continue in college students regardless of knowledge, knowing one's HIV status becomes exponentially more important. By exploring the pros and cons of testing in the eyes of college students, it may reveal points of intervention by elucidating the reasons students may choose (or not choose) to get tested for HIV.

Constructs from the Health Belief Model and Transtheoretical Model (decisional balance) were used to inform survey formation and fill gaps in the current research. Perceived risk has an inconsistent relationship with a reduction in HIV-risk behavior, while the association between

risk and HIV testing has not been explored in the college population. By measuring perceived risk (a component of the health belief model), it may be possible to further determine how attitudinal factors (perceived pros and cons) impact risk in college students, a topic that has not been fully explored in the literature.

The objective of this study was to determine if pro and con decisional balance items were associated with HIV testing in college students. In addition, self-perceived risk was assessed to determine if it affected by the receipt of an HIV test or answers to decisional balance items. Additional information about HIV testing rates and demographic factors was collected to develop a baseline understanding of testing behaviors at the University of Pittsburgh.

Based on background information gathered from an extensive literature review, the following hypotheses were developed for exploration through data collection and analysis:

H_1: Age will be associated with HIV testing

H_2: Gender will not be associated with HIV testing

H_3: Ethnicity will not be associated with HIV testing

H_4: 45% of students will have been tested for HIV

H_5: "Pro" decisional balance items will be associated with HIV testing

H_6: "Con" decisional balance items will not be associated with HIV testing

H_7: "Pro" decisional balance items will not be associated with perceived risk

H_8: "Con" decisional balance items will be associated with perceived risk

H_9: Perceived risk will not be associated with HIV testing

4.0 METHODS

To explore HIV testing behavior in college students and its relationship to self-perceived HIV risk and the pros and cons of testing, a survey was administered to University of Pittsburgh undergraduate students during the spring semester of 2010.

4.1 SAMPLING PROCEDURES

Recruitment

Based on enrollment data for the fall of 2009, 10,585 students were enrolled in the College of Arts and Sciences (CAS) at the University of Pittsburgh (University of Pittsburgh Fact Book 2009). Out of a total 17,000 undergraduate students enrolled at the University, 62% of undergraduates matriculate in CAS (University of Pittsburgh Fact Book 2009). Sample size was calculated to do an estimate, using a 95% confidence interval, with a 5% margin of error, assuming 50% of students would have been tested for HIV. By using a proportion of 50%, this gives us the most conservative estimate of sample size. Using this information, the project goal was to collect 384 surveys. Accounting for a 20% loss in surveying, at least 480 students were targeted for survey completion.

To sample a portion of the undergraduate population, student participants were recruited through CAS classes with a high enrollment in an effort to capture a diverse sample of students.

Initially, two recent (2007) CAS graduates were asked which classes drew a large number of undergraduate students. Their answers provided a starting point for class selection. Enrollment data for the recommended classes was verified using the College of Arts and Sciences online course catalog (http://www.courses.as.pitt.edu/). Additional classes were selected randomly based on an enrollment capacity of 100 or more students. To increase the number of surveys collected, one additional music instructor was contacted who taught three smaller recitation classes of 25 students each. Contact information for each professor was gained by looking at the appropriate departmental website which provides e-mail addresses for faculty.

This sampling method was selected to maximize the number of surveys collected. Additionally, previous studies surveying students on HIV-related topics have used a similar sampling strategy, utilizing large, introductory-level undergraduate classes as a means to collect data (Opt et al. 2004; Teague 2009).

Prior to contacting any faculty members, Institutional Review Board (IRB) approval for this project was obtained (approval letter in Appendix A.1). A standardized recruitment e-mail (Appendix A.2) was sent to eight professors in the College of Arts and Sciences teaching the following classes:

Table 1. Courses Contacted for Survey Administration

Course Number	Course Name	Enrollment Capacity
13830	Introduction to Sociology	100
10714	Introduction to Cultural Anthropology	300
12178	Sociology of Everyday Life	100
13870	Natural Disasters	360
10244	Introduction to Philosophical Problems	120
11376	Introduction to Stars, Galaxies, and Cosmos	240
11832	Societies	200
12146	Introduction to World Music recitation	25
10220	Introduction to World Music recitation	25
33778	Introduction to World Music recitation	25

Out of eight professors contacted, five professors responded favorably, giving me permission to survey their classes. One professor did not want to provide class time for survey administration but offered to provide my information and have individual students contact me. I declined this offer to keep the sampling strategy consistent and maintain strict anonymity. Two professors did not respond to the recruitment e-mail.

If the professor responded favorably to the recruitment e-mail, a mutually agreeable time was arranged for survey administration, either before or after a class session. *Table 2* details information for the courses from which surveys were collected:

Table 2. Courses Surveyed and Response Rates

Course Number	Course Name	Enrollment Capacity	Actual Enrollment	No. of surveys collected	Response Rate
13830	Introduction to Sociology	100	100	70	70%
10714	Introduction to Cultural Anthropology	300	300	147	49%
12178	Sociology of Everyday Life	100	105	88	84%
13870	Natural Disasters	300	300	86	29%
12146	Introduction to World Music: recitation	25	25	21	84%
10220	Introduction to World Music: recitation	25	13	12	92%
33778	Introduction to World Music: recitation	25	18	16	89%
Total		875	861	440	51.1%

All surveys distributed had a cover page that included the IRB-approved introductory script (see Appendix A.3). The survey instrument was stapled behind the cover page so that student answers could be kept confidential. Prior to survey distribution, all students were verbally told their participation was voluntary, anonymous and confidential. Additionally, after

the first class was surveyed, students were asked not to complete a survey if they had already done so in a previous class. Surveys were distributed to all students present in class at the time mutually arranged by the professor and researcher. Enrolled students absent from class on the day of survey administration were not given the opportunity to participate. Upon completion, participants placed surveys in a covered box to ensure the results remained confidential and anonymous. Response rate information for each class sampled can be found in *Table 2*.

Given that response rates were calculated for the number of students enrolled and not the number of students present in class on the day of survey administration, a response rate of 51.1% is a conservative estimate. After survey administration in the Introduction to Cultural Anthropology class, the number of students present was estimated by counting the number of students in one section of the classroom and extrapolating that estimate to the rest of the room. Using this technique, 250 students were estimated to be present, which would increase the response rate to 58% for that class. Since not all students were counted in each class, the response rates calculated provide a general estimate.

Additionally, the timing of survey administration affected response rate. Courses that were surveyed during the last 10 minutes of class (Introduction to Sociology, Introduction to World Music recitations I and II) averaged a response rate of 74.6%. When less than five minutes was given at the end of a class period to administer surveys (Natural Disasters) the response rate was extremely low (29%), since many students chose to leave rather than participate. Surveys that were administered at the beginning of a class period (Introduction to cultural Anthropology, Sociology of Everyday Life) got a response rate of 55.7%. The overall study response rate was likely affected more by the timing of survey administration and not the content of the survey itself.

4.2   SURVEY INSTRUMENT

Development of Decisional Balance Scale:

The survey instrument administered was replicated from Lauby et al.'s article "Decisional Balance, Perceived Risk and HIV Testing Practices" (2004). The instrument was designed based on the theoretical concepts of the health belief model and decisional balance, as detailed in the background section. The design of the decisional balance scales used a triangulation of qualitative and quantitative methodologies. Lauby et al. conducted 30 in-depth interviews with individuals considered at "high risk" for HIV in the Philadelphia area. During qualitative interviews, individuals were asked about their HIV testing history and the reasons they had chosen to get tested. The data collected from qualitative interviews was organized according to positive and negative statements regarding HIV testing.

The researchers also conducted a literature search about HIV testing attitudes and supplemented data from qualitative interviews with published information about reasons for testing. The researchers then chose 12 positive and 17 negative statements about taking an HIV test and pilot tested the statements on a convenience sample of 130 community members from a neighboring ZIP code to where the final survey was administered. The statements were judged by respondents on a 5-point Likert scale and items were deleted that were not easily understood (defined as 10% of the pilot sample responding "I don't know"). Statements were also deleted to which 90% of the sample had the same response (unacceptable response variance). The final decisional balance scales were determined to have acceptable internal consistency (Cronbach's alpha coefficient of .72 for the pro statements and .76 for the con statements).

Decisional balance scale items were further categorized using factor analysis, resulting in 3 pro and 3 con "factors" for HIV testing. The three factors relating to the pros of testing were:

security and responsibility, prevention of transmission, and availability of medication. The three

factors relating to the cons of testing were: Preferring not to know, stigma of being HIV positive,

and fear of needles (see *Tables 3 and 4* for the results of factor analysis for the decisional balance

scales).

Table 3. Pro decisional balance scale items categorized by factor analysis

PROS
Factor 1: Security and Responsibility
Everyone should get an HIV test
Taking the HIV test would give you a sense of security
Getting tested for HIV helps you stay health to care for your family and friends
Factor 2: Prevention of Transmission
If you had HIV, you wouldn't want to infect anyone else
You want to know if you have HIV, so you don't give it to someone else
If you had HIV, you would want to tell your sex partner
You want to make sure you don't have HIV, so you could tell your sex partner you don't have it
Factor 3: Availability of Medication
If you found out you had HIV, there are new medicines you could take

Table 4. Con decisional balance scale items categorized by factor analysis

CONS
Factor 1: Preferring not to know
If you had HIV, you would rather know about it
It's better not to know if you have HIV
Factor 2: Stigma of being HIV positive
If you had HIV, people would reject you
If you had HIV, you might get fired from your job or not be able to get a new job
If you found out you had HIV, you couldn't face your family
Factor 3: Fear of Needles
You are worried about the needle used in the HIV blood test

4.2.1   Survey instrument administered

Decisional Balance:

Statements from the pro and con decisional balance scales described above were included on the survey. Participants rated their agreement or disagreement with the statements on a 1-5 Likert scale, where 1 = strongly disagree and 5 = strongly agree.

Perceived Risk:

Using a perceived risk index also developed by Lauby et al., respondents were asked to rate the likelihood of the following on a 5-point Likert scale (1 = very unlikely; 5 = very likely): that they are currently infected with HIV, that they will ever become infected with HIV in their lifetime, that things they have done have increased their chances of getting HIV, and that their sex partner will get HIV.

HIV testing:

Survey participants were asked whether they had ever received an HIV test (yes or no). If an individual responded yes, they were asked how many HIV tests they had received in their lifetime.

Demographics:

The survey instrument also included a brief demographic section asking for the participant's age, sex, and ethnic background.

The entire survey instrument can be found in Appendix A.4

4.3   STATISTICAL ANALYSIS AND HYPOTHESIS TESTING

4.3.1   Data Entry

After survey administration, Predictive Analytics Software (PASW) Statistics V.18 was used for data entry and analysis. Demographic variables were coded numerically to allow for statistical comparison to Likert scale data. All Likert scale data was coded according to the numerical level of agreement or disagreement specified by the respondent (on a 1 to 5 scale; 1 = strongly disagree, 5 = strongly agree). All missing data was entered as "99." HIV testing was coded as "1=yes" and "0=no." If the participant answered "no," a "0" was automatically entered in the follow-up question asking for the number of HIV tests taken in their lifetime. If the respondent had been tested for HIV and provided a specific number lifetime tests, that number was entered accordingly. If a participant had been tested for HIV but did not provide the number of lifetime tests, the data was entered as missing ("99").

4.3.2   Demographic analysis and recoding of variables

Demographics

Frequencies were run for all demographic variables: age, gender, and ethnicity. After initial sample characteristics were analyzed, age data was grouped into four categories (18-19, 20-21, 22-23, >24) to allow for further statistical analysis. Ethnicity was also recoded into "Caucasian " and "non-Caucasian" for analysis purposes.

To run initial chi-square analyses between independent variables and HIV testing, all decisional balance variables were dichotomized. Scores ranging from 1-3 were categorized as "disagree" and coded as "1." Scores ranging from 4-5 were labeled "agree" and coded as "2." The recoding of perceived risk questions grouped 1-3 as "low perceived risk" (1) and 4-5 as "high perceived risk" (2).

Hypothesis testing was analyzed at two levels, first with significance set a $p < .05$. Then a Bonferroni correction was used to raise the standard for significance from $p < .05$ to $p < .004$. This helps eliminate the possibility of "fishing" for significance, even though the survey was based in theoretical constructs.

4.3.3 Hypothesis #1: Age will be associated with HIV testing

A One Way Analysis of Variance (ANOVA) was run with age categories and number of lifetime tests to determine if there was a statistically significant difference in the mean number of tests received by each age group.

4.3.4 Hypothesis #2: Gender will not be associated with HIV testing

A chi-square analysis was run with HIV testing and gender to determine any association. An independent t-test was run between number of lifetime HIV tests and gender to determine if a statistically significant difference between males and females exists.

4.3.5 Hypothesis #3: Ethnicity will not be associated with HIV testing

Ethnicity was recoded so that 1=non-Caucasian and 2=Caucasian. A chi-square analysis was performed to determine any association between receipt of an HIV test and ethnicity.

4.3.6 Hypothesis #4: 45% of students will have been tested for HIV

Based on a recent study by Opt and Loffredo (2004), who collected HIV testing data in a sample of college students, we would expect about 45% of students to have been tested for HIV. Opt and Loffredo's estimate was used because it is the most conservative recent statistic found. A two sample test of proportions was run to determine if the current sample proportion of students tested for HIV differed significantly from the proportion found in Opt and Loffredo's (2004) study.

4.3.7 Hypothesis #5: "Pro" decisional balance items will be associated with HIV testing

Chi-square analyses were run between dichotomized "pro" decisional balance items and the receipt of an HIV test. A mean "pro" decisional balance score was calculated for each respondent by averaging his or her scores on the eight "pro" survey questions. Average pro scores were then dichotomized as previously described. A chi-square analysis was done to determine any overall association between answers to "pro" decisional balance items and HIV testing.

A mean value was calculated for each of the three "pro" factors in the decisional balance scale. Mean scores were dichotomized (1-3=disagreement; 3.01-5=agreement) and chi-square analyses were run to test for an association with HIV testing.

4.3.8　Hypothesis #6: "Con" decisional balance items will not be associated with HIV testing

Chi-square analyses were run between each "con" decisional balance survey question and the receipt of an HIV test. A mean "con" score was calculated for each individual by averaging their Likert scale responses on the eight "con" survey questions. Average con scores were then dichotomized as described above. A chi-square analysis was completed to determine any overall association between answers to "con" decisional balance items and HIV testing.

A mean value was calculated for each of the three "con" factors in the decisional balance scale. Mean scores were dichotomized (1-3=disagreement; 3.01-5=agreement) and chi-square analyses were run to test for an association with HIV testing.

4.3.9　Hypothesis #7: "Pro" decisional balance items will not be associated with perceived risk

An average perceived risk score for each individual was calculated by averaging his or her answers to the four risk survey questions. Average risk scores were dichotomized (1-3.0=low risk; 3.01-5=high risk) and a chi-square analysis was run with dichotomized "pro" decisional balance scores.

4.3.10　Hypothesis #8: "Con" decisional balance items will be associated with perceived risk

Using the dichotomized average risk scores described above, chi-square analyses were run with dichotomized "con" decisional balance scores to determine association.

4.3.11 Hypothesis #9: Perceived risk will not be associated with HIV testing

Chi-square analyses were run between each perceived risk question and HIV testing. A mean score was calculated for each of the four perceived risk questions. Taking the average of the four perceived risk questions, a mean risk estimate for the entire sample was calculated. A mean perceived risk score was also calculated for each individual by averaging his or her answers from the four perceived risk questions. Finally, mean perceived risk scores were dichotomized (1-3.0 = low risk; 3.01-5 = high risk) and chi-square analysis was used to test for association with HIV testing.

4.3.12 Summary of hypothesis testing

The following table provides a summary of the statistical methods used to test each hypothesis.

Table 5. Summary of statistical methods for hypothesis testing

Hypothesis	Statistical test
Age will be associated with HIV testing	One-way ANOVA
Gender will not be associated with HIV testing	Chi-square; independent t-test
Ethnicity will not be associated with HIV testing	Chi-square
45% of students will have been tested for HIV	Two-sample test of proportions (Estimate; 95%CI: 39.51%-50.49%)
"Pro" decisional balance items will be associated with HIV testing	Chi-square
"Con" decisional balance items will not be associated with HIV testing	Chi-square
"Pro" decisional balance items will not be associated with perceived risk	Chi-square
"Con" decisional balance items will be associated with perceived risk	Chi-square
Perceived risk will not be associated with HIV testing	Chi-square

5.0   ANALYSIS AND RESULTS

Following statistical analysis, results were analyzed to draw appropriate conclusions.

5.1   STUDY POPULATION

Four hundred forty (n=440) students, enrolled in one of the seven undergraduate College of Arts and Sciences classes sampled, completed a survey. Participants ranged in age from 18 to 55 (Mean (M) = 19.5, Standard Deviation (SD) = 2.468). For analysis, age data was collapsed into four categories; 18-19 years old, 20-21 years old, 22-23 years old, and >24 years old (see *Table 6*).

Table 6. Participant breakdown by age

Age	*Frequency*	*Percent*
18-19	281	65.3
20-21	118	27.4
22-23	20	4.7
>24	11	2.6
Missing	10	
Total	**440**	**100.0**

Out of all respondents, 40% (n= 174) were male and 60% (n=261) were female.

Table 7. Participant breakdown by gender

Gender	Frequency	Percent
Male	174	40.0
Female	261	60.0
Missing	5	
Total	**440**	**100.0**

The ethnic background of the survey participants was as follows: 83.1% (n=355) of students were Caucasian, 7.3% (n=31) of students were African American, 6.3% (n=27) of students were Asian/Pacific Islander and 1.4% (n=6) of students were Hispanic. Eight students (1.9%) identified their ethnic background as "other" and 13 students did not identify their ethnic background. Ethnic group statistics mirrored available university demographic data (Appendix B.1)

Table 8. Participant breakdown by ethnic background

Ethnic Background	Frequency	Percent
Caucasian	355	83.1
African American	31	7.3
Asian/Pacific Islander	27	6.3
Hispanic	6	1.4
Other	8	1.9
Missing	13	
Total	**440**	**100.0**

5.2   HIV TESTING

Out of 440 respondents, 11.8% (n=51) of the sample had ever received an HIV test. Among individuals who had ever been tested for HIV, 62.7% (n=32) had taken one test, 15.7% (n=8) had taken two tests, 9.8% had taken three tests and 9.8% had taken four or more tests, with 10 being the maximum number of lifetime HIV tests received. One individual had been tested for HIV but did not specify the number of tests received. The distribution of lifetime HIV tests is shown below (*Table 9*).

Table 9. Number of lifetime HIV tests

Number of Tests	Frequency	Percent
0	381	88.40
1	32	7.42
2	8	1.86
3	5	1.16
4	2	.46
5	1	.23
8	1	.23
10	1	.23
Missing	9	
Total	440	100.0

Overall, a smaller percentage of students had been tested for HIV as compared to Opt et al. (2004). However, for students who had been tested, the number of tests received closely aligns with data collected from the same study.

Table 10. Number of HIV tests received; comparison to Opt et al. 2004

Number of HIV tests	Menser 2010	Opt et al. 2004
1	62.7%	60%
2	15.7%	15%
3	9.8%	13%
4 or more	9.8%	13%

Out of those individuals tested, 64.7% (n=33) were male, and 35.3% (n=18) were female. The age breakdown of students who had been tested was as follows: 45.1% (n=23) were 18-19 years old, 35.3% (n=18) were 20-21 years old, 11.8% (n=6) were 22-23 years old, and 7.8% (n=4) were 24 years or older.

5.2.1 Age will be associated with HIV testing

A one-way ANOVA looking at the number of tests received by an individual by age, shows statistically significant differences by age category $F(3, 419) = 6.132$, $p < .001$, supporting the hypothesis of association. The mean number of times students had been tested increased as age category increased (*Table 11*).

Table 11. Number of lifetime HIV tests; mean and SD

Age	N	Mean	SD
18-19 years old	276	.08	.277
20-21 years old	117	.15	.362
22-23 years old	19	.32	.478
> 24 years old	11	.36	.505
Total	423	.12	.326

Post-hoc analysis revealed a statistically significant difference between the 18-19 year-old group and the 22-23 year-old group (p = .013), as well as with the 24 and older group (p = .024).

5.2.2 Gender will not be associated with HIV testing

A chi-square analysis did not show a significant association between gender and receipt of an HIV test, failing to reject the hypothesis of no association. Further, an independent t-test for number of lifetime HIV tests and gender did not show a significant difference in mean number of tests between males and females (p=.202).

5.2.3 Ethnicity will not be associated with HIV testing

A chi-square analysis between dichotomized ethnic groups (non-Caucasian and Caucasian) found no significant association with HIV testing (p=.924), failing to reject the null hypothesis of no association.

5.2.4 45% of students will have been tested for HIV

A two sample test of the difference of proportions (z=-10.56, p<.001) revealed a statistically significant difference between the sample of students tested for HIV in the current sample and previous data suggesting testing rates of 45%. Thus, we reject the hypothesis of no difference, concluding that a smaller proportion of students were tested for HIV in the current study's sample.

5.3   DECISIONAL BALANCE

5.3.1   "Pro" decisional balance items will be associated with HIV testing

A chi-square analysis between the dichotomized mean of the pro decisional balance items and HIV testing did not show a significant association, rejecting the alternative hypothesis. However, the relationship between "pro" decisional balance items and HIV testing was also explored in further detail. A chi-square analysis was run between each dichotomized "pro" decisional balance item and HIV testing. Significant dichotomized variables at the .05 level are shown in *Table 12*.

Table 12. Pro decisional balance items and HIV testing; significance at the .05 level
*Individuals who had been tested for HIV had higher agreement with the statements below

Dependent variable	Dichotomized independent variable	p-value
Pro Decisional Balance Items:		
Have you ever taken an HIV test?	Everyone should get an HIV test	.000*
	Taking the HIV test would give you a sense of security	.020*
	You want to make sure you don't have HIV, so you could tell your sex partner you don't have it	.037*

Upon applying a Bonferroni Correction to the dichotomized variables (p<.004), significance remained only between "everyone should get an HIV test" and HIV testing.

A further analysis of the "pro" decisional balance factors looked at the mean level of agreement with each factor. The highest level of agreement was in the factors "prevention of transmission" and "security and responsibility" as seen in *Table 13*.

Table 13. Mean agreement with "pro" decisional balance items

Factor	Mean	Standard Deviation
Security and responsibility	3.95	.773
Prevention of transmission	4.58	.446
Availability of medicines	3.76	.861

Dichotomizing the mean scores for each decisional balance factor (1-3 = disagreement, 3.01-5.00=agreement), only the "security and responsibility" factor was significant with HIV testing, $X^2(1)=7.543$, (p=.006).

Overall, survey participants generally agreed more with the "pro" than "con" decisional balance items. The mean scale score for "pros" was 4.24 on a scale of 1 (strongly disagree) to 5 (strongly agree). The standard deviation was 0.47. The mean scale score for "cons" was 2.13

with a standard deviation of 0.57. A paired t-test verified that the pro and con-scale means were significantly different, t = 55.83, p <.001.

5.3.2 "Con" decisional balance items will not be associated with HIV testing

A chi-square analysis between HIV testing and the dichotomized mean "con" score for each individual did not find a significant association, failing to reject the hypothesis of no association.

Data analysis also allowed for a more specific look at the relationship between decisional balance items and HIV testing than the original hypotheses predicted, including analyses of each individual con item with HIV testing and the con questions as a group. A subset of the con decisional balance items were significant with HIV testing, as listed in *Table 14.*

Table 14. Con decisional balance items and HIV testing; significance at the .05 level

Dependent variable	Dichotomized independent variable	p-value
Con Decisional Balance Items:		
Have you ever taken an HIV test?	You are worried about the needle used in the HIV blood test	.024

Upon applying a Bonferroni correction, no "con" decisional balance items remained associated with HIV testing.

Further analysis of "con" decisional balance factors revealed the highest mean level of agreement was with questions in the factor "stigma of being HIV positive."

Table 15. Mean agreement with "con" decisional balance factors

Factor	Mean	Standard Deviation
Preferring not to know	1.43	.712
Stigma of being HIV positive	2.63	.784
Fear of needles	2.14	1.20

The only factor found to be significant with HIV testing was "Fear of needles" $X^2(1)=5.086$, (p = .024).

5.3.3 "Pro" decisional balance items will not be associated with perceived risk

"Con" decisional balance items will be associated with perceived risk

In a chi-square analysis of dichotomized average risk and dichotomized "pro" and "con" decisional balance scales, neither the "pro" or "con" decisional balance scale was found to be associated with perceived risk. Thus, we fail to reject the hypothesis of no association between pro decisional balance items and perceived risk. Further, we reject the hypothesis of association between con decisional balance items and perceived risk.

5.3.4 Perceived risk will not be associated with HIV testing

Dichotomizing average perceived risk scores into low perceived risk (1.00-3.00) and high perceived risk (3.01-5.00), it was found to be significant with HIV testing $X^2(1)=4.110$ (p<.05), rejecting the hypothesis of no association. Dichotomizing average risk also revealed that only 9 students out of 440 surveyed (2%) had a high perceived risk score. Additionally, almost 28% of

the student sample estimated their HIV risk as 1.00, the lowest perceived risk score possible (*Figure 3*).
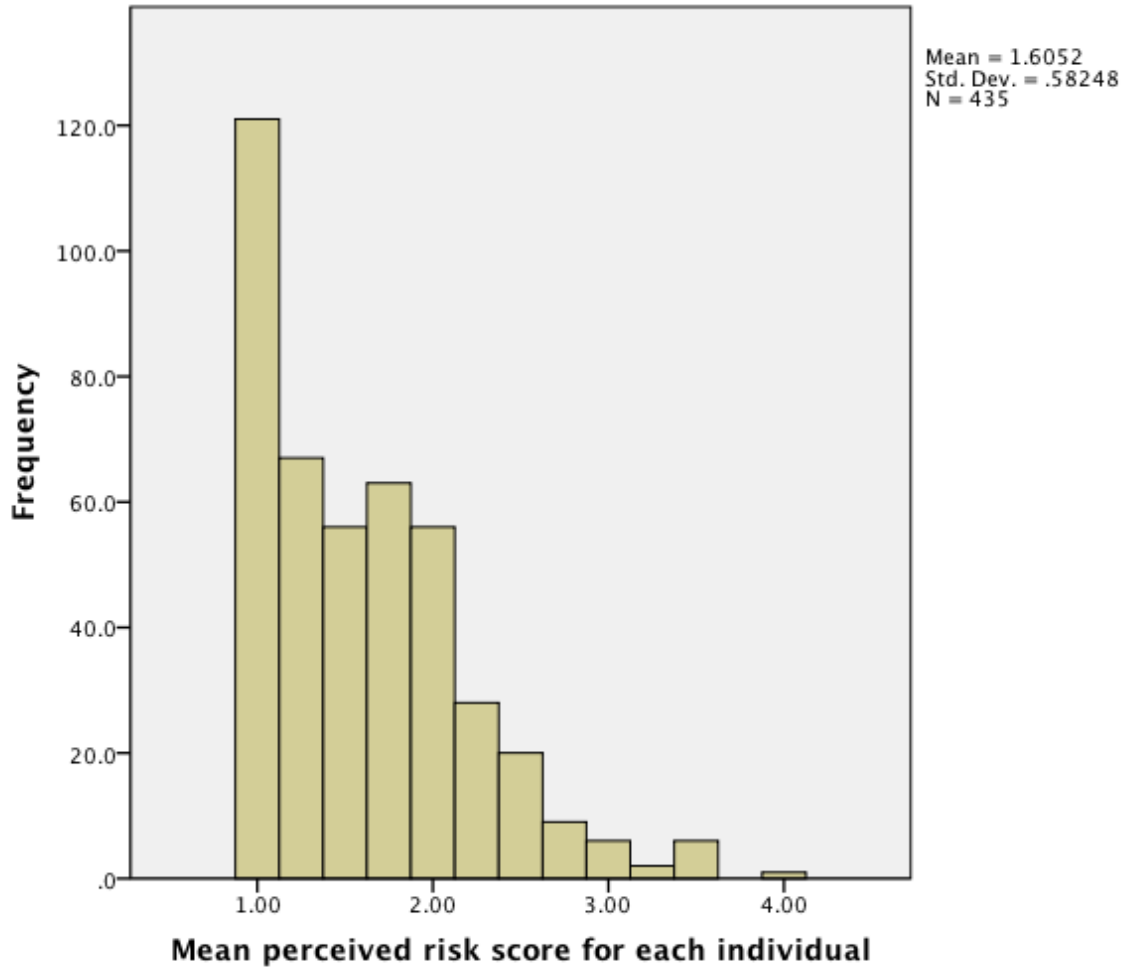
Figure 3. Frequency of mean perceived risk scores in the sample

Individual perceived risk questions were then dichotomized and chi-square tests were run with HIV testing to determine any significant association. Independent variables significant at the .05 level are listed below (*Table 16*).

Table 16. Perceived Risk and HIV testing; significance at the p< .05
**Individuals who had been tested for HIV had higher agreement with the statements below

Dependent variable	Dichotomized independent variable	p-value
Perceived Risk:		
Have you ever taken an HIV test?	The likelihood of becoming infected with HIV in my lifetime	.043**
	The likelihood I have done things to increase my risk of getting HIV	.000**
	The likelihood that my sex partner will get HIV	.021**

Applying a Bonferroni correction, "the likelihood I have done things to increase my risk of getting HIV" remained significant with HIV testing at the p<.004 level.

Following the analysis of each perceived risk question independently, the mean perceived risk score was analyzed for the entire sample. The mean perceived risk for the sample (n=435) was 1.60 with a standard deviation of .582, indicating that for the entire sample, perceived risk was low (1=low risk, 5=high risk).

After initial analysis of perceived risk questions to HIV testing, chi-square analyses were run with demographic variables to determine association. When gender was compared to dichotomized perceived risk questions individually, a statistically significant difference (p = .005) was found between male and female respondents and "the likelihood I have done things to increase my risk of getting HIV" and "the likelihood that my sex partner will get HIV." Females

were more likely than males to say they had *not* done things to increase their risk of HIV and males were more likely to say their sex partner would get HIV than females.

The overall perceived risk score was broken down by age, gender, and ethnicity to determine any significant differences in mean perceived risk by demographic groups. An independent t-test found no significant difference in the overall mean perceived risk scores of males and females. Additional ANOVA analyses did not reveal any significant differences by age or ethnicity.

6.0   DISCUSSION

6.1.1   HIV Testing

The present study found a lower percentage of students, 11.8% (95% confidence interval 8.6%-14.58%), had been tested for HIV than other recent university samples in which 52% (Demmer and Caroleo 2001) and 45.7% (Opt and Loffredo 2004) had been tested. Using the more conservative estimate for proportion of students tested (45.7%), the present sample was found to be significantly lower. While it is difficult to extrapolate testing data across campuses due to the differing nature of university student populations, the low percentage found in this sample raises concern given the statistics about HIV risk behavior on college campuses (Lewis et al. 2009).

While The University of Pittsburgh offers free rapid HIV testing once a week in the health education office, constraints of the current testing program, including budget, personnel and policy restrictions only allow about 400 students to be tested for HIV per academic year under the existing program. While students can choose to receive a blood test at the student health clinic or can be referred off campus for an HIV test, students are less likely to be tested for HIV if resources are not available on campus (Hayden 1994). Out of a student body of over 17,000 students, the number of rapid HIV tests available constitutes less than 2.5% of undergraduate students on campus. The limited testing resources on campus may be a factor in the low testing rate seen in this study.

The survey data collected found that the mean number of times students had been tested for HIV increased with age category. Anastasi et al. (1999) and Opt et al. (2004) had similar findings; that college students who have been tested for HIV are likely to be older. While Opt et al. conclude based on their data that intervention efforts should be targeted to younger students, the overall small percentage of students tested for HIV in this sample suggest that all age brackets could benefit from an HIV testing campaign or intervention.

There are very few descriptive studies on the cross-section of college students who are tested for HIV, including information on gender and ethnicity. The most recent study of this type, from 1999, failed to mention any correlation between gender or ethnicity and HIV testing. HIV testing data for the U.S. population shows that African Americans and women are more likely to have been tested for HIV based on 2006 statistics (CDC 2008). However, this study failed to find any significant relationship between gender or ethnicity and HIV testing.

6.1.2 Pro decisional balance items and HIV testing

While no association was found between the overall "pro" decisional balance items and HIV testing, individual "pro" items found to be significant elucidate positive statements that could be used as motivators in scaling up HIV testing practices in college students. These statements included "everyone should get tested for HIV," "taking the test would give you a sense of security" and "if you had HIV you would want to tell your sex partner."

Students agreed most strongly with the factors "prevention of transmission" and "security and responsibility" which provides some insight as to the reasons a student may choose to get tested. 99% of students agreed with statements about HIV testing regarding prevention of transmission, and 85% agreed with statements about security and responsibility. The high level

of agreement with these factors may provide insight on messages that could be effectively used and accepted by the student body for a school-wide HIV testing campaign with mass appeal. Future research should further explore the acceptability of these factors as testing motivators using focus groups. If found to be effective, these messages would be incorporated into an intervention that would resonate with a large portion of the college population.

6.1.3   Con decisional balance items and HIV testing

While no relationship was found between the overall "con" decisional balance score and HIV testing, further analysis did reveal a significant association between the statement about fear of needles and HIV testing. Individuals who had been tested for HIV versus those who had not, responded to this question significantly differently. Thus, fear of needles as a barrier to HIV testing should be addressed on campus. While only approximately 14% (n=61) of the sample agreed or strongly agreed with being worried about a needle in the HIV test, out of these individuals, only one had ever been tested for HIV. It is important for students to know that there are non-needle tests for HIV available. Testing services available on campus should offer and emphasize oral-fluid and urine testing options to remove this perceived disadvantage to HIV testing (Peralta et al. 2007).

The con sub-scale, "stigma" received the highest level of agreement from respondents. Among students who strongly believed they would be stigmatized if diagnosed with HIV, none of them had been tested for HIV. Nationwide data also suggests there exists strong stigma against HIV testing. Almost 70% of Americans reported that people would think less of them if it they found out they were tested for HIV (Views and Experiences with HIV Testing in the U.S. 2009). This relationship was found to be true even when controlling for demographic factors

(age and ethnicity). Data from the present study coupled with U.S. testing data suggests that stigma for HIV testing and diagnosis is still very prevalent.

Stigma related to HIV testing also suggests that the test is not seen as normative behavior. Understanding current normative beliefs of college students about HIV testing highlights a possible leverage point for behavior change. Making HIV testing a more socially acceptable behavior among this population may help increase testing rates.

6.1.4   Decisional balance and perceived risk

No relationship was found between pro or con decisional balance items and perceived risk. Previous research of HIV at-risk individuals found that individuals with higher perceived risk may have more negative views of HIV testing (higher "con" scores and lower "pro" scores) (Lauby et al. 2005). This results in a decisional balance assessment where the cons outweigh the pros, potentially due to fear of an HIV positive status (Lauby et al. 2005). However, college students do not generally anticipate a positive HIV test, which may explain the lack of association (Marelich & Clark 2005; Bernard & Prince 1998). Future research should continue to explore this relationship in the college student population.

6.1.5   Perceived risk and HIV testing

While this study found that perceived risk was associated with HIV testing, the overall perceived risk score in this student sample was low (mean = 1.6 on a scale 1 to 5). This is consistent with findings from other college campus samples in which students were not personally concerned about becoming infected with HIV (Opt et al. 2004). However, while other studies suggest that

approximately 15-25% of students would consider themselves at risk for HIV (McCormack 1997; Bustamante 1992), only 3% of this study sample estimated their perceived risk of HIV to be high (mean perceived risk score >3.01).

While the literature shows an inconsistent relationship between college students perceived risk for HIV and adopting risk reduction behaviors (Lewis and Mallow 1997), the association between perceived risk and HIV testing is not well documented in college students. This study found that perceived risk was significantly associated with HIV testing which suggests students should continue to be educated about HIV risk factors to guide formation of personal estimations of risk. In turn, this may influence a student's decision to be tested for HIV.

Lauby et al. (2005) suggest that greater perceived risk for HIV may decrease the likelihood of taking a test, since risk may be associated with the anticipation of a positive test result. When this occurs, the cons outweigh the pros on the decisional balance scale. Thus, interventions must also focus on increasing perceived pros of testing relative to the cons perceived by an individual. As the concept of decisional balance suggests, a change or behavior will only occur if the pros outweigh the cons (Glanz 2008). The association of perceived risk and HIV testing should continue to be explored in future research. A study grounded in the Transtheoretical Model could look at decisional balance for HIV testing in the context of stages of change and more conclusively state how decisional balance items influence movement along the behavior change continuum and ultimately, influence the decision to get tested for HIV.

While no significant differences were found between male and females in their overall perceived risk score, differences were found when risk questions were analyzed separately. Males were more likely to say they had done things to increase risk of HIV. Further research should be done to explore specific risk behaviors in males and females to determine if

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differences between male and female risk behavior is accurately reflected in males' beliefs of increased risk. Males were also more likely than females to say their sex partner was likely to get HIV. Given the wording of the question, it is difficult to interpret whether this could reflect the belief that peers are more at risk for HIV than individuals perceive themselves to be. While this has been explored previously in the literature and found to be true (Brown 1998; Mickler 1993), updated studies on self-perceived versus peer-perceived risk for HIV should be explored. The differences in beliefs between males and females could be simultaneously investigated.

6.2   LIMITATIONS

This study involves a small cross-section of University of Pittsburgh students, so the generalizability of the results is limited because of the use of a non-random sample. While the survey was pre-tested on an at-risk population, it was not pre-tested among college students, which may have improved the clarity of survey questions among the target population. In addition, the survey did not exhaustively explore all pros and cons that may impact HIV testing in college students. Further, the factor analysis used by Lauby et al. (2006) resulted in two factors ("*availability of medicine*" and "*fear of needles*") with only one question in each, reducing the utility of these factors.

Future research should apply a mixed methods approach to first qualitatively explore a more comprehensive list of perceived pros and cons for testing. This data could then be used to inform the development of a more comprehensive and population-specific survey. A future study should also assess risk behavior as it relates to perceived risk and HIV testing to further understand how students perceive their HIV susceptibility based on personal risk-behaviors.

Additionally, given the sensitive nature of the data collected on this survey, it is possible that responses were impacted by concerns about privacy. Even though many steps were taken to ensure confidentiality, students filled out surveys in a large classroom environment where students were surrounded by their peers.

From a theoretical standpoint, grounding a survey in the Health Belief Model and concepts of decisional balance focuses solely on individual-level factors that influence HIV testing behavior, limiting the scope of the survey instrument. Previous research has suggested that theoretical constructs such as condom use self-efficacy and communication self-efficacy are important in adopting HIV preventive behaviors (Boone et al. 2004; Burns & Dillon 2005; Abbey et al. 2007; Wang et al. 2004; Farmer et al. 2006; DiIorio et al. 2000; Catania et al. 1994). While HIV testing self-efficacy has not been explored in the literature, it reveals an area for future research.

Additionally, the decision to get tested is influenced by environmental factors including economic, social, policy or organizational-level influences (Sumartojo 2000). Moving forward, HIV testing behavior should be considered in the larger context of the social-ecological environment. This will require a shift from purely individualist thinking and more consistent recognition that the structural environment can play a role in changing HIV behavior (Sumartojo 2000). Future research must take a multidisciplinary approach to focus on a more complete picture of the factors that influence HIV behavior including social norms, availability of resources within the community and local and national policies that ultimately influence HIV testing behavior.

Finally, statistical analysis was not exhaustive in this study. Running chi-square tests on dichotomous variables does not control for the effect of other independent variables and may not

reveal the most significant relationships in the data. A more advanced analysis using logistic regression and the calculation of odds ratios should be done with this data set to gain further insight on which variables are the most significant predictors of HIV testing.

6.3   IMPLICATIONS FOR FUTURE RESEARCH

This study fills a gap in the literature by exploring decisional balance and perceived risk as it relates to HIV testing behavior. The results suggest that a fear of needles and stigma continue to be a deterrent in receiving an HIV test for college students. Notions of "security and responsibility" are significantly linked to the likelihood of receiving an HIV test, which provides direction for future research on HIV testing in this population.

In addition, this study adds to the body of evidence that a very low percentage of University students are being tested for HIV. While the present study reported a lower percentage than has been found in previous research, studies consistently report testing rates of less than 50% (Lewis et al. 2009). The repeatedly low percentage of students that report being tested raises questions about current HIV prevention efforts on campus. While interventions have consistently targeted a reduction in HIV risk-behaviors, there has been far less focus on increasing HIV testing as a health protective behavior. As the prevalence of risk behaviors remains high on college campuses, the efficacy of HIV risk reduction interventions needs to be assessed. In turn, a focus on scaling up HIV testing behavior may be more beneficial in the current climate of HIV risk behavior seen on college campuses.

The exploration of perceived pros and cons of testing in this study provides insight into the areas that can be leveraged as motivators for HIV testing in university populations. Future

research should look at designing HIV testing campaigns around the ideas of "security and responsibility" and "prevention of transmission" and their efficacy should be evaluated. Promoting testing messages around the topic of "security and responsibility" may be especially efficacious because the message is "health affirmative" (e.g. to confirm HIV negative status). Prevention messages that are "loss framing" may not be effective in a college population where most students do not anticipate a positive test result (Marelich and Clark 2005; Bernard and Prince 1998).

Past studies that analyze the construct of perceived risk look mainly at its association to a reduction in HIV risk behaviors. While the relationship between perceived risk and a reduction in HIV risk behaviors is somewhat inconsistent (Lewis & Malow 1997; Yep 1995; Freimuth et al. 1987; Gray et al. 1989; Adefuye 2009; Chng et al. 2006), this study suggests that increasing perceived HIV risk may be used to increase rates of HIV testing on campus. This relationship has been researched very little in the college student population. While the current study suggests that perceived risk may potentially be used as a leverage point to increase testing rates, future studies should continue to explore this association and the efficacy of HIV preventive interventions designed at increasing testing and not simply decreasing risk behaviors.

Research has shown that educational interventions often fail to reduce HIV risk behaviors given the inconsistent link between HIV knowledge and risk reduction in college students (Sheer 1995). Thus, future interventions should focus not only on reducing risk behaviors, but also on scaling up HIV testing in *all* students. This would comply with recent recommendations by the CDC to test all individuals ages 13-64 during yearly healthcare visits (Branson et al. 2006).

Over 60% of the present study sample agreed with the statement "everyone should get tested for HIV." Of those in agreement, 82% had never been tested for HIV, which suggests even

those individuals who have not been tested for HIV, may be open to testing. An "opt-out" testing program would test all students at an annual healthcare visit unless they chose not to be. While this idea has not been specifically explored in university populations, the CDC supports "opt-out" testing as part of their most recent set of HIV testing guidelines (Branson et al. 2006). Continued reliance on risk-based testing limits the ability of health care professionals to diagnose and treat HIV (Beckwith et al. 2005), especially given the fact that many college students fail to identify that their behavior puts them at risk for HIV.

In considering all social-ecological levels for potential interventions, policy level changes have the ability to affect wide-spread behavioral modifications. This encompasses the CDC's recommended policy on "opt-out" testing. Beckwith et al. (2005) state that intervening at a policy level and testing individuals irrespective of perceived risk is cost effective (Paltiel et al. 2005) and will decrease stigma still associated with HIV testing. However, there are still many U.S. states, including Pennsylvania, with laws in place that contradict this CDC recommendation and operate HIV testing under an "opt-in" policy (Penn. Confidentiality of HIV-related Information Act ch. 45 § 7605 2009). While there are ethical and confidentiality issues that need to be considered in this policy debate, current practices that require a separate signed consent form for HIV testing decreases the likelihood that an individual will agree to be tested (Zetola et al. 2008).

In conclusion, the low rates of HIV testing in undergraduate college students are of great public health concern given the high prevalence of risk behaviors in this population. Students who participate in risk behaviors and are not tested for HIV limit their own ability to take advantage of efficacious treatments and put sex or drug partners at risk for contracting the virus. Given the close-knit nature of many college campuses and the powerful nature of university

sexual networks, an HIV epidemic has the ability to spread quickly among college students. Future research should continue to explore the determinants of HIV testing in the college student population. Revealing these potential points of intervention for increasing rates of HIV testing is of great public health significance in the college student population.

APPENDIX A: METHODS

A.1   IRB APPROVAL LETTER

University of Pittsburgh
Institutional Review Board

3500 Fifth Avenue
Pittsburgh, PA 15213
(412) 383-1480
(412) 383-1508 (fax)
http://www.irb.pitt.edu

Memorandum

To: Michelle Menser
From: Christopher Ryan, PhD , Vice Chair
Date: 12/22/2009
IRB#:   PRO09120023
Subject: Perceived Risk, Decisional Balance, and HIV Testing Practices in College Students

The above-referenced project has been reviewed by the Institutional Review Board. Based on the information provided, this project meets all the necessary criteria for an exemption, and is hereby designated as "exempt" under section

Please note the following information:

- If any modifications are made to this project, use the " **Send Comments to IRB Staff**" process from the project workspace to request a review to ensure it continues to meet the exempt category.
- Upon completion of your project, be sure to finalize the project by submitting a "**Study Completed**" report from the project workspace.

Please be advised that your research study may be audited periodically by the University of Pittsburgh Research Conduct and Compliance Office.

A.2   RECRUITMENT E-MAIL

Dear Professor/Dr. _____,

My name is Michelle Menser and I am a second year MPH student in the Graduate School of Public Health at the University of Pittsburgh.

For my master's thesis, I am conducting a research study on self-perceived risk of HIV, the perceived pros and cons of HIV testing and its relationship to actually receiving an HIV test. My population of interest is undergraduate students at the University of Pittsburgh.

I am hoping to use College of Arts and Sciences classes with high enrollment as a means to collect data by asking students to complete a brief, anonymous survey (less than 5 minutes) before or after class. Student participation would be entirely voluntary.

I have identified your class, (*insert class name*), as a possible opportunity for data collection and was hoping to discuss with you the possibility of coming to this class once between the dates of January 6-15, 2010 to administer this questionnaire.

This study has been approved by the University of Pittsburgh Institutional Review Board. Please feel free to contact me if you have any further questions or concerns.

Thank you for your time and consideration.

Best Regards,

Michelle Menser
MPH Candidate, 2010
Department of Behavioral and Community Health Sciences
Graduate School of Public Health, University of Pittsburgh

A.3 INTRODUCTORY SCRIPT

Perceived Risk, Decisional Balance, and HIV Testing Practices in College Students
University of Pittsburgh Graduate School of Public Health
Department of Behavioral and Community Health Sciences

The purpose of this research study is to explore the link between perceived risk of HIV, the perceived pros and cons of testing and HIV testing behavior in college students. For that reason, I will be surveying college students from a number of different classrooms at the University of Pittsburgh and asking them to complete a brief (5 minute) survey. Participants must be 18 years of age or older to complete a survey. If you are willing to participate, this survey will ask about your background (age, race and gender), as well as your perceptions of risk for HIV, the pros and cons of testing, and whether you have ever received an HIV test. There are no foreseeable risks associated with this project, nor are there any direct benefits to you. This is an entirely anonymous questionnaire, so none of your responses can be traced back to you in any way. All responses will be kept strictly confidential, with the results under lock and key. Your participation is voluntary, and you can choose to stop this survey at any time. This study is being conducted by Michelle Menser, who can be reached at mem139@pitt.edu, if you have any questions.

A.4   SURVEY INSTRUMENT

Master's Thesis Survey

Please circle the appropriate response:

Gender: Male   Female   **Age**: _____

Ethnic background:

African American   Caucasian   Hispanic   Asian/Pacific Islander   Other

Please circle your level of agreement or disagreement with the following statements:

	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
Everyone should get an HIV test	1	2	3	4	5
Taking the HIV test would give you a sense of security	1	2	3	4	5
Getting tested for HIV helps you stay healthy to care for your family and friends	1	2	3	4	5
If you had HIV, you wouldn't want to infect anyone else	1	2	3	4	5
You want to know if you have HIV, so you don't give it to someone else	1	2	3	4	5
If you had HIV, you would want to tell your sex partner	1	2	3	4	5
You want to make sure you don't have HIV, so you could tell your sex partner you don't have it	1	2	3	4	5
If you found out you had HIV, there are new medicines you could take	1	2	3	4	5
If you had HIV, you would rather not know about it	1	2	3	4	5

It's better not to know if you have HIV	1	2	3	4	5
If you had HIV, people would reject you	1	2	3	4	5
If you had HIV, you might get fired from your job or not be able to get a new job	1	2	3	4	5
If you found out you had HIV, you couldn't face your family	1	2	3	4	5
You are worried about the needle used in the HIV blood test	1	2	3	4	5

Please circle the appropriate response:

	Very Unlikely	Unlikely	Neutral	Likely	Very Likely
The likelihood that I am currently infected with HIV	1	2	3	4	5
The likelihood of becoming infected with HIV in my lifetime	1	2	3	4	5
The likelihood I have done things to increase my risk of getting HIV	1	2	3	4	5
The likelihood that my sex partner will get HIV	1	2	3	4	5

Have you ever taken an HIV test?   Yes   No

If Yes, how many tests have you taken in your lifetime? _____

Comments:

_____

_____

Thank you for your participation!

APPENDIX B: ANALYSIS

B.1   DEMOGAPHIC COMPARISON TO UNIVERSITY DATA

Demographics from the study sample mirrored data available from the University of Pittsburgh

CAS (University of Pittsburgh Fact Book 2010). Comparisons are provided below.

Demographic characteristic	Sample Percent	CAS Percent
Gender		
Male	39.5%	45.1%
Female	59.3%	54.9%
Ethnic Background		
Caucasian	83.1%	79.1%
African American	7.3%	8.7%
Asian/Pacific Islander	6.3%	5.5%
Hispanic	1.4%	1.2%
Other	1.9%	1.2%

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