

THE ROLE OF HEALTH LOCUS OF CONTROL ON
DEFENSIVE PROCESSING OF A THREATENING
HIV HEALTH MESSAGE

By

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CHAPTER I

INTRODUCTION

In the spring of 1981, the first cases of acquired immunodeficiency syndrome (AIDS) were reported in the United States. Three years later, the virus that causes AIDS, or human immunodeficiency virus (HIV), was isolated by medical research (Substance Abuse and Mental Health Services Administration [SAMHSA], 2002). Since then, HIV/AIDS epidemic has continued to grow worldwide. In the U.S., nearly one million people were living with HIV in 2003, and an estimated 40,000 new HIV infections occur every year (Centers for Disease Control and Prevention [CDC], 2006). Despite the growth of the HIV/AIDS epidemic, fewer people die from AIDS related deaths than ever before with the development of antiretroviral therapy (ART), or highly active retroviral therapy (HAART). In essence, HAART has transformed HIV from a terminal disease to a chronic illness by increasing the lifespan and improving immune system functioning of people living with HIV.

With the development of anti-HIV medications, more individuals are living longer and feeling healthier. However, the decreased rates of HIV/AIDS-related deaths have been associated with a recent upsurge in high-risk behaviors in people living with HIV (PLH), such as sharing needles and engaging in unprotected sexual intercourse

(Halkitis et al., 2005; Kalichman, Kelly, & Rompa, 1997; Kalichman, 2000; Kozal et al., 2004; Marks, Burris, & Peterman, 1999; Schiltz & Sandfort, 2000). Continued involvement in risky behaviors despite knowledge of HIV-status can lead to numerous negative consequences, such as increased transmission of sexually transmitted diseases (STDs), Hepatitis B and C, and other pathogens related to the development of opportunistic infections, such as Kaposi's sarcoma (CDC, 2006; Rio, 2003; SAMHSA, 2002). Another negative consequence of continued involvement in risky behaviors is the more recent development of the phenomenon of HIV *superinfection* (also known as HIV *reinfection* in the literature) (Kaiser, 2005).

HIV superinfection occurs when different strains of HIV are passed between individuals, potentially leading to the transmission of a drug-resistant virus. Superinfection poses serious health consequences, including HAART resistance, rapid AIDS progression, and accelerated death. Transmission of drug-resistant HIV viruses can lead to fewer treatment options; once the virus has become resistant to multiple combinations of drugs, a PLH may be out of treatment options until newer drug classes are developed (SAMHSA, 2002; Rio, 2003). Data on the transmission of drug resistant HIV indicates that incidents of superinfection have been reported in numerous U.S. cities, and the rates of occurrence are on the rise (Little, 2000; Rio, 2003; Smith, Wong, & Hightower, 2004).

Given the novelty of this phenomenon and the increasing rates of transmission of drug-resistance viruses, it is evident that knowledge regarding superinfection has not reached or impacted many PLH. Furthermore, transmission of drug-resistant strands of HIV disputes the belief held by some PLH that engaging in sexual intercourse or sharing needles with another seropositive person poses few or no risks. Research examining beliefs and attitudes

towards the possibility of HIV superinfection has demonstrated that many men who have sex with other men (MSM) do not have knowledge of superinfection, many are skeptical and doubt its existence, and others believe it is possible yet continue to engage in risky sex practices (Adam, Husband, Murray, & Maxwell, 2005; Colfax et al., 2004; Davis, Hart, Imrie, Davidson, Williams, & Stephenson, 2002).

Taken together, the increasing transmission rate of HIV and the incidence of superinfection highlight the importance of reducing risky behaviors in PLH (Schreibman & Friedland, 2003; Rio, 2003; National Institute of Health [NIH], 2006). Recent prevention efforts have focused on the medical setting as an important avenue for risk reduction counseling, with reliance on medical practitioners to facilitate services (CDC, 2001). However, despite CDC efforts to increase the provision of prevention messages in medical settings, risk reduction counseling is routinely provided by less than two-thirds of providers (Marks, et al., 2002; Metsch et al., 2004). Many barriers exist in medical settings that prevent dissemination of risk reduction messages by medical staff, such as beliefs that attempts will not be useful or time and resource constraints (Rio, 2003; Schreibman & Friedland, 2003; CDC, 2003).

Accordingly, with the multiple barriers that exist in medical settings that prevent dissemination of risk reduction messages by medical staff, other methods of communicating these messages is necessary. Clinic or office environments where PLH are treated can be “structured to support and enhance prevention” (CDC, 2003; pp. 6), including the use of preventative and educational material readily accessible to patients, such as posters and pamphlets. Written educational materials have been used in clinical settings for decades with the goal of facilitating preventative health behaviors (CDC, 2003). Years of research show

that encouraging healthier lifestyles and risk reduction can prevent disease and improve the health of people who experience common medical conditions (e.g., heart disease, STDs). Often these campaigns are designed to induce high levels of negative affect in order to increase the significance and salience of the message (Hill, Chapman, & Donovan, 1998; Sutton, 1992). However, research has shown that when people receive personally relevant information such as a threatening health message, they show a tendency to be critical or doubt the validity of the information. This phenomenon is referred to in the social psychology literature as *defensive bias* (Ditto, Croyle, & Croyle, 1995; Jemmott, Ditto, & Croyle, 1986; Kunda, 1987). Defensive responding has been shown to occur in many situations, such as when the threat involves that of diseases (e.g., heart disease; Croyle, Sun, & Louie, 1993), or in response to information about risky behaviors that may lead to negative health outcomes (e.g., alcohol use; Leffingwell, Nuemann, Leedy, & Babitzke, 2007).

The Problem

Defensive processing of a threatening health message may lead an individual to minimize the perceived relationship between one's behaviors and the negative outcomes presented in the message. For example, in a study conducted by Colfax and colleagues (2004), MSM were asked questions about their beliefs regarding the risk of superinfection. Many participants indicated having previously heard of the phenomenon of superinfection and the health risks associated with it. However, one-third of these men displayed a defensive reaction to the information by either challenging the empirical validity of the research or by minimizing their own risk of contracting a treatment-resistant strain. As a result, these men continued to engage in risky sexual behaviors. Similar themes of defensive processing in

response to messages about superinfection have been observed in other studies (Davis et al., 2002; Adam et al., 2005).

Therefore, individuals for whom health messages are intended may be the least likely to accept them. For this reason, it is important to identify certain characteristics of people who are more likely to defensively process relevant health messages in order to make health messages more meaningful and salient. Identifying characteristics that contribute to defensive processing will allow the content of threatening health messages to be adapted in order to minimize defensive processing and promote adaptive behavior. To date, the only moderating factors of defensive bias that have been investigated are message relevance and perceived seriousness of the disease.

Research has shown that message relevance plays an important role in whether or not people are likely to engage in defensive processing in response to a threatening health message. People are more likely to scrutinize a health message for fault when their own behaviors are incongruent with the behaviors prescribed in the message (Kunda, 1987). Furthermore, regardless of how threatening the message is (high or low degrees of threat), individuals are likely to show defensive processing of the information (Liberman & Chaiken, 1992). Perceived prevalence and curability of a disease have also been shown to impact defensive processing of a threatening health message; the more rare and dangerous the disease is perceived to be, the more motivated people are to engage in defensive processing of the message (Ditto, Jemmott, & Darley, 1988; Jemmott et al., 1986; Kunda, 1987).

Another factor that may influence defensive processing of threatening information is an individual's perceived control over behaviors that lead to negative health conditions. If a negative event is perceived as controllable by personal actions, a person may be more likely

to display defensive bias when confronted with messages that are incongruent with current behaviors (e.g., a smoking ad viewed by a smoker). People who believe that a threatening health condition can be avoided by personal actions (e.g., quitting smoking) may be more likely to engage in defensive processing in order to prevent thinking of oneself as irrational (for continuing to smoke) or at-risk (for lung cancer). In questioning or doubting the threatening information, the individual may fail to change the risky health behaviors that initially put one at risk. Thus, identifying a person's perceived control over health events may help physicians, public health efforts, and media campaigns to present threatening health information in a way that would minimize the immediate defensive reaction.

The degree of control over health that individuals perceive to have is referred to as "locus of control." This area of research has its roots in Rotter's (1954) social learning theory, which focuses on how expectancy beliefs, formed from previous situations, work to promote behavior. In line with this theory, Wallston and Wallston (1978) sought to examine how locus of control influences the prediction of health behavior, and developed the Multidimensional Health Locus of Control scale (MHLC). The MHLC scale measures dispositional expectancy beliefs regarding health along three dimensions: the extent to which individuals believe their health is a result of their own actions (internal HLC), the extent to which individuals feel their health is under the control of powerful others, such as physicians (powerful others HLC), and the extent to which individuals believe their health can only be explained by chance or fate (chance HLC).

Research with this scale has revealed a positive relationship between health locus of control and preventative health behaviors. Specifically, individuals who believe their health is a result of their own actions are more likely to take steps to promote their health, whether it

be exercising (Slenker, Price, & O'Connell, 1985; Carlson and Petti, 1989), controlled alcohol consumption (Shope, Copeland, Maharg, & Dielman, 1993), breast self-examination (Bundek, Marks, & Richardson, 1993), or eating healthy (Bell, Quandt, Arcury, McDonald, & Vitolins, 2002).

Furthermore, the MHLC scale has also been used with a HIV-positive population. Research has shown that PLH often score higher on the internal and powerful others HLC scales than the chance HLC scale (Evans, Ferrando, Rabkin, & Fishman, 2000; Molassiotis et al., 2002; Preau et al., 2005; Ubbiali et al., 2008). Higher scores on the internal and powerful others subscales are also associated with initiation of treatment (Evans et al., 2000), risk reduction (Kelly et al., 1990) and better overall perceptions of health (Preau et al., 2008). It appears that PLH are largely aware of how their behaviors (e.g., treatment adherence, risk reduction) have an impact on subsequent health. Furthermore, high scores on the powerful others scale illustrates the impact of physician advice and directives on PLH health beliefs.

Given the relationship between health locus of control and positive health behaviors, it may be possible to match health messages to patient's locus of control. Research has suggested that receiving health recommendations phrased in a language consistent with an individual's HLC lends to an increased likelihood of complying with the recommendations in the message (Quadrel & Lau, 1989; Williams-Piehot, Schneider, Pizarro, Mowad, & Salovey, 2004). Therefore, it may be that receiving HLC-consistent health messages reduces the tendency to engage in defensive processing, leading to changes in health behaviors. However, a review of the literature revealed a lack of previous research examining the relationship between defensive bias and HLC.

Present Study

The purpose of the current study was twofold. The first goal was to determine if a message regarding the threat of superinfection evoked defensive processing in a sample of HIV-positive patients who receive services in an internal medicine specialty clinic. It was predicted that when threatening health messages about superinfection are presented, defensive processing in individuals for whom the message is highly relevant (i.e., men who engage in UAI or share needles) would occur significantly more than in individuals for whom the message is irrelevant. The second purpose of the current study was to determine if HLC is related to the tendency to engage in defensive processing, after reading a threatening health message that links UAI/sharing needles to the incidence of superinfection. It was hypothesized that individuals with high internal HLC beliefs would be more likely to engage in defensive processing than individuals with low internal HLC beliefs, due to the difference in perceived controllability of the disease. Additionally, it was hypothesized that individuals with high scores on the HLC chance scale will be less likely to engage in defensive processing than individuals with low chance HLC beliefs.

CHAPTER II

LITERATURE REVIEW

This review will begin with a focus on the human immunodeficiency virus/acquired immunodeficiency syndrome (HIV/AIDS), including information on prevalence, mode of transmission, and treatment. Next, the relatively recent discovery of “superinfection” will then be discussed, along with research regarding behaviors that can put one at risk for experiencing this phenomenon. This review will subsequently focus on the importance of secondary prevention efforts with individuals who are HIV-positive, with emphasis on the medical setting as an avenue for disseminating information regarding the risks and consequences of superinfection. Next, the concept of defensive bias will be introduced, with discussion about factors which promote defensive processing of threatening health messages. Finally, health locus of control will be proposed as a potential mediator of the defensive bias, and the review will conclude with the aims of the present study.

HIV/AIDS

In the spring of 1981, the first cases of AIDS were reported in the United States. Three years later, the virus that causes AIDS, or HIV, was isolated by medical research (Substance Abuse and Mental Health Services Administration [SAMHSA], 2002). Since

then, the HIV/AIDS epidemic has continued to grow worldwide. Most recent data indicate that by the end of 2003, an estimated 1,039,000 to 1,185,000 persons in the United States were living with HIV/AIDS, with 24%-27% unaware of being infected with HIV. Furthermore, approximately 40,000 new HIV infections are estimated to occur yearly (Centers for Disease Control and Prevention [CDC], 2006).

HIV infection has disproportionately impacted men who have sex with men (MSM), with most of the HIV-infected population contracting the disease by high-risk homosexual male contact (46%), followed by high-risk heterosexual contact (27%), injection drug use (IDU, 22%), and finally those exposed through both homosexual male contact and IDU (CDC, 2006). In addition to disproportionately affecting MSM, HIV/AIDS infection has disproportionately impacted minority populations. According to the CDC (2006), 47% of people living with HIV (PLH) are African American, 17% are Hispanic, and 1% are Asian/Pacific Islanders and American Indians/Alaska Natives. Caucasian Americans represent only 34% of the HIV-infected population. Overall, African American males bear the greatest burden of HIV infection, with the HIV diagnosis rate being seven times higher in African American males than white males. Regarding gender rates of HIV transmission, 74% of the HIV-infected population is male, although female heterosexual transmission is on the rise. Similar to statistics involving minority men, African American females are also disproportionately affected by HIV, with the diagnosis rate being more than 19 times the diagnosis rate for white females (CDC, 2006).

HIV is transmitted in infectious body fluids including blood, semen, vaginal secretions, and breast milk (Blalock & Campos, 2003). Modes of transmission include

contact with infected blood (e.g., injection drug use, blood transfusion), sexual contact, and mother-to-baby contact. Once infected, the presence of HIV in the blood stream is indicated by the CD4 count and the viral load. The former signifies the number of CD4 white blood cells present in a milliliter of blood, representing an index of a person's immune system functioning. Normal, healthy individuals generally have a CD4 count ranging from 500 to 1,400 cells, but after the first year of HIV-infection, this count decreases at a rate of approximately 30 to 90 cells yearly. On the other hand, the viral load count measures the number of HIV particles per milliliter of blood plasma, and provides an estimate of the rate at which CD4 cells are being destroyed. Eventually, HIV kills so many CD4 cells that an individual's immune system is unable to eliminate bacteria or infections that a typical immune system is able to tolerate or can make the person sick. These infections are referred to as "opportunistic infections." AIDS is the later stage of HIV infection, and is diagnosed by the combination of two factors: a CD4 count lower than 200 and the presence of an opportunistic infection (e.g., *Pneumocystis carinii* pneumonia, Kaposi 's sarcoma; SAMHSA, 2002).

Despite the growth of the HIV/AIDS epidemic, fewer people die from AIDS-related deaths than ever before with the development of antiretroviral therapy (ART), or highly active retroviral therapy (HAART). The estimated number of deaths among persons living with AIDS increased steadily through 1994 (approximately 49,600 deaths during 1994) and 1995 (approximately 50,000 deaths), and since then, this number has significantly declined in the U.S. due to the development of HAART (CDC, 1997). In essence, HAART has transformed HIV from a terminal disease to a chronic illness by increasing the lifespan and improving immune system functioning of PLH. Usually

consisting of a “cocktail” of three or more anti-HIV drugs, HAART is designed to inhibit HIV replication, slow progression of the disease, and delay immune system decline.

HAART works by driving down levels of HIV in blood, semen, and vaginal secretions, until the viral load is described as “undetectable.” Having an undetectable viral load is one of the main aims in HIV treatment, as it signifies excellent viral suppression.

However, contrary to beliefs held by many PLH, achieving an undetectable viral load does not mean that HIV is completely absent from the blood stream and therefore impossible to transmit to an HIV-negative (i.e., seronegative) partner. Alternatively, it just means that transmission of the virus is less likely to occur (SAMHSA, 2002).

With the development of anti-HIV medications, more individuals are living longer and feeling healthier. However, the decreased rates of HIV/AIDS-related deaths have been associated with an upsurge in high-risk behaviors in PLH, such as sharing needles and engaging in unprotected sexual intercourse (Halkitis et al., 2005; Kalichman et al., 1997; Kalichman, 2000; Kozal et al., 2004; Marks et al., 1999; Schiltz & Sandfort, 2000). Kalichman (2000) reviewed 22 studies conducted between the years 1993 and 1997 and found that out of a total of 4,000 PLH, approximately one-third of these individuals continued to engage in risky sexual and drug use behaviors despite knowledge of their HIV-positive status.

Continued risky behavior despite knowledge of HIV-positive status has been found to be related to multiple factors. Specifically, research conducted with MSM has suggested that unprotected sex occurs more frequently with primary or monogamous partners versus casual sex partners (see review by Kalichman, 2000; Heckman, Kelly, & Somlai, 1998; Rhodes, Donoghoe, Hunter, & Stimson, 1993), although some research has

shown the opposite (Kalichman et al., 1997; Kalichman, Roffman, Picciano, & Bolan, 1997). Furthermore, involvement in risky behaviors despite positive HIV status is also related to low SES, negative mood states such as anxiety and depression, and substance use (Kalichman, 2000). Other studies have shown that the negative stigmas associated with HIV and the fear of disclosing HIV-positive status leads to continued risky behaviors (Bayer, 1996; Fisher, Willcuts, Misovich, & Weinstein, 1998). Finally, PLH who have achieved an undetectable viral load and feel physically healthy are more likely to engage in high-risk behaviors. As described previously, this association is thought to be related to the (incorrect) belief that having an undetectable viral load translates into an inability to transmit HIV to others (see review by Rio, 2003; Schreibman & Friedland, 2003).

Engaging in risky behaviors despite knowledge of HIV infection poses negative consequences for both the HIV-positive risk-taker and their HIV-negative partners. First, engaging in risky sexual and drug use behaviors without disclosure of positive serostatus can lead to exponential growth in HIV-infection rates in seronegative populations. As noted previously, 24-27% of people with HIV are unaware of being infected, and consequently continue to engage in risky behaviors (CDC, 2006). As emphasized by Schreibman and Friedland (2003), although millions of people in the U.S. put themselves at risk for the transmission of HIV, it can only occur through people who are already infected with the disease. For the HIV-positive risk-taker, continued involvement in risky behaviors may result in various undesirable consequences, including increased transmission of sexually transmitted diseases (STDs), Hepatitis B and C, and other pathogens related to the development of opportunistic infections (CDC, 2006; Rio, 2003;

SAMHSA, 2002). Moreover, continued involvement in risky behaviors despite HIV status contributes to the recent development of the phenomenon of HIV “superinfection” (also referred to as reinfection in the literature; Kaiser, 2005).

HIV Superinfection

In 2004, a 40-year-old man in New York City was infected with a strain of HIV that rapidly progressed to the development of AIDS. Whereas most HIV infections progress to AIDS over an average period of ten years, this man developed AIDS in a short period of 20 months (Kaiser, 2005). Furthermore, the strain he was infected with had developed resistance to three of four classes of antiretroviral drugs (i.e., 19 of 20 available drugs). Antiretroviral resistance is a common experience for PLH, as all viruses have the ability to “learn from and possibly outwit” human immune system and medication responses (SAMHSA, 2002). Resistance occurs when the virus no longer responds to the drug, and as a result, a new combination of antiretroviral drugs is often prescribed. However, this man had never taken HAART, and as reported by the New York City Department of Health and Mental Hygiene, in newly diagnosed patients, drug-resistant HIV was “extremely rare” (Kaiser, 2005).

Prior to this individual case, research conducted with primates had demonstrated that the phenomenon of superinfection was possible (Kaiser, 2005). Nonetheless, experts from a range of medical and scientific disciplines dismissed the applicability of these findings to the human species, and continued to assume that once a person was infected with HIV, they could not be reinfected (Cheonis, 2005). This was one of the first human-documented cases of an HIV “superbug” that included both transmission of resistance to

multiple drugs and rapid AIDS progression, and served as a (temporary) setback to many scientists' efforts at developing a universal HIV vaccine.

In sum, the documentation of HIV superinfection holds many important implications for PLH and the public as a whole. As evident from above, HIV superinfection poses serious health consequences, including HAART resistance, rapid AIDS progression, and accelerated death. Transmission of drug-resistant HIV viruses can lead to fewer treatment options; once the virus has become resistant to multiple combinations of drugs, a PLH may be out of treatment options indefinitely, or until a novel type of antiretroviral is developed (SAMHSA, 2002; Rio, 2003). In addition to the transmission of drug-resistance HIV, unprotected sex with HIV-positive partners (or “seroconcordant” relationships) can lead to transmission of other diseases (CDC, 2006; Rio, 2003; SAMHSA, 2002). Taken together, these factors result in poor prognoses for PLH. Currently, NIH guidelines recommend HIV Genotypic or Phenotypic Resistance Testing prior to beginning HAART regimens to rule-out any classes of HIV medications to which the virus may be invulnerable. Resistance testing is also used when one's viral load suddenly rises or does not evidence any changes. However these tests are costly; ranging anywhere from 600 to 800 dollars. Thus, resistance testing is more likely to be used once a patient demonstrates resistance to HAART (see review by Parker et al., 2007; Novak et al., 2005, L. Lay, personal communication, August 2008).

Once the phenomenon of HIV “superinfection” was identified and the mechanisms of action behind it were explained, researchers sought to determine the incidence of this phenomenon. Data on the transmission of treatment-resistant HIV indicates that incidents of superinfection have been reported in numerous U.S. cities, and

the rates of occurrence are on the rise. In one study, the prevalence of antiretroviral resistance increased from 3.4% to 12.4% between the years of 1995 to 2000 in North America (Little et al., 2000; Rio, 2003). According to data presented at the 11th Conference on Retroviruses and Opportunistic Infections in 2004 by Smith and colleagues (2004), the rate of superinfection was 6.5% in newly diagnosed MSM in a sample of 54 patients in two California cities. Additionally, in a sample of 151 PLH presenting for care in clinics across New York state, 11.3% of patients had a least one drug-resistant viral mutation (Parker et al., 2007). Estimates of transmission of drug-resistance HIV have ranged from 8% to 26% in North American and Europe (see review by Kozal et al., 2004). Overall, transmission of drug-resistant HIV has been observed in numerous studies, occurring through pathways of heterosexual intercourse, homosexual intercourse and intravenous drug use (Parker et al., 2007).

Given the novelty of this phenomenon and the increasing rates of transmission of drug-resistance viruses, knowledge regarding superinfection may have not yet reached or impacted many PLH. Transmission of drug-resistant strands of HIV disputes the belief held by some PLH that engaging in sexual intercourse/sharing needles with another seropositive person poses no risks. In fact, MSM may even seek out seroconcordant partners in order to “relieve the burden of having to practice consistently safe sex” (see review by Kalichman et al., 2000). Recent research suggests that HIV-positive men may engage in more intentional unprotected anal intercourse (UAI) with their seropositive partners rather than seronegative partners, referred to as “bare-backing” in the literature (Halkitis, Parsons, & Wilton, 2003; Mansergh, Marks, Colfax, Guzman, Rader, & Buchbinder, 2002). In one sample of HIV-positive MSM, ‘bare-backing’ occurred with

91% of partners who were known to be HIV-positive, versus 34% of partners whose serostatus was unknown (see review by Halkitis et al., 2002; McConnell & Grant, 2003).

Studies have shown that many HIV-positive MSM seek out intimate relationships according to concordant serostatus. For example, 'bare-backing' websites have made the search for seroconcordant partners possible. These websites allow MSM to search for other men who are interested in engaging in UAI, specific to serostatus (Parsons, Severino, Grov, Bimbi, & Morgenstern, 2007). In a review of studies on online sexual activity specific to bare-backing, Chiasson and colleagues (2007) found that HIV negative men who found seropositive positive partners online reported less concern about HIV transmission due to advances in HAART therapy and the ability to achieve an undetectable viral load. Similarly, seropositive men reported engaging in UAI with serodiscordant partners found online.

With increased rates of UAI and superinfection, research has sought to identify variables related to HIV-positive MSM's decisions to engage in UAI with seroconcordant partners. Halkitis and colleagues (2005) identified four sets of factors associated with risky sexual practices in seropositive MSM. First, men who engaged in these risky behaviors evinced less self-evaluation regarding sexual activities and behaviors. Furthermore, these men had more "hedonistic" expectations of sex, higher levels of sexual compulsivity, and higher levels of drug use with and without sex. Lastly, HIV-positive men who engaged in UAI with seroconcordant partners endorsed fewer beliefs about the negative effects of superinfection on health. In other words, these men had lower levels of concern regarding superinfection, STDs, and pathogens that could lead to the development of opportunistic infections.

In addition to the factors identified by Halkitis and colleagues (2005), lack of knowledge regarding HIV transmission has also been linked to risky behaviors in HIV-positive MSM (Colfax et al., 2004; Fawzi et al., 2006). In one study conducted by Fawzi and colleagues (2006), poor knowledge regarding HIV transmission was significantly associated with lack of HIV medications, problems obtaining clothing, difficulty in accessing mental and medical health care, and a history of sexual abuse in a sample of primarily Puerto Rican men. In a qualitative narrative study conducted by Davis and colleagues (2002), 25 seropositive MSM at an HIV outpatient clinic in London were interviewed regarding their beliefs about viral load and the possibility of superinfection. Numerous men expressed confusion related to having an “undetectable” viral load and the implications for transmitting the virus to seronegative individuals, with most expressing that it was impossible to contract the virus from a seropositive partner. Many men who had previously heard about superinfection reported uncertainty regarding the reality of this phenomenon in humans (Davis et al., 2002).

Adams and colleagues (2005) found similar themes in interviews with 51 seropositive MSM from Toronto. Although many men cited the possibility of superinfection as a reason for engaging in safe sex practices, many of the other participants doubted the existence of superinfection and concluded that available research was not sufficient to warrant condom use. The authors concluded that with future and more conclusive research in support of superinfection, seropositive MSM may be more likely to account for these findings when engaging in sexual relations (Adam, et al., 2005):

“the salience of these narratives suggests that better scientific knowledge [regarding superinfection] could have an impact in tipping the balance in safer sex

decision-making for many men who do not practice safe sex consistently or who have abandoned it altogether (pp. 70).”

In a quantitative study specific to superinfection, Colfax and colleagues (2004) also found that lack of knowledge regarding HIV-transmission risks was related to engaging in risky sexual behaviors. They assessed knowledge and beliefs regarding superinfection in a sample of 554 MSM recruited via snowball sampling methods in the San Francisco bay area. Although most participants had heard of reinfection, 15% of the sample indicated no prior knowledge of reinfection. In comparison, knowledgeable participants had been HIV positive longer and had attended more years of college. Of those who had only heard of reinfection, approximately one-third disagreed that it was possible, and a similar proportion denied concerns about reinfection. Moreover, only half of the knowledgeable participants indicated engaging in safer sex practices because of these concerns; the other half expressed skepticism about the reality of reinfection and continued to engage in risky sexual practices (Colfax et al., 2004).

In sum, despite knowledge of HIV infection, many PLH continue to engage in risky sexual and drug-related behaviors. Engaging in risky behaviors is associated with numerous factors (e.g., relationship status, economic status) and results in many negative consequences, including transmission of HIV to seronegative individuals, increased transmission of STDs, Hepatitis B and C, and other pathogens, and finally, risk of superinfection. HIV-positive men who engage in UAI with seroconcordant partners have been shown to hold more hedonistic expectations of sex and exhibit decreased levels of sexual self-evaluation. Other factors that may lead to involvement in risky sexual behaviors include higher levels of sexual compulsivity, drug use, and lack of knowledge

regarding HIV transmission. Considered together, the aforementioned research highlights the importance of targeting risky behaviors in PLH to promote healthier and longer living (Schreibman & Friedland, 2003; Rio, 2003; NIH, 2006).

Since the first case of HIV was documented in the U.S. in 1981, the health care community has accumulated a substantial literature base focused on HIV prevention. Although a review of these efforts is largely beyond the scope of this paper, in general, the goal of prevention research is to reduce or eliminate behaviors that lead to the transmission of HIV. These efforts have mostly focused on changing risky sexual behavior and drug use involving the HIV-negative population, and have emphasized the development of “cognitive, social, and technical competencies and skills” associated with the reduction of risky behavior, largely in-line with harm reduction models of psychology behavioral interventions (Blalock & Campos, 2003; Rio, 2003). However, recently research focus has shifted to prevention strategies within the HIV-positive population, referred to as secondary prevention. This is a crucial population to study not only to reduce HIV transmission to seronegative individuals, but to reduce the risk of superinfection in seropositive individuals (Schreibman & Friedland, 2003; Rio, 2003; NIH, 2006).

Secondary Prevention in Medical Settings

Literature demonstrates support for risk reduction counseling with HIV-positive individuals. A meta-analysis of ten randomized controlled trials (RCTs) and two non-RCTs conducted between 1988 and 2004 indicated a significant reduction of unprotected sex and fewer documented STDs among PLH (Crepaz et al., 2006). Large reductions in needle-sharing behaviors were also observed, although the effect size was not significant.

Characteristics of efficacious interventions included: (1) based on behavioral theory, (2) specifically targeted at reduction of risk behaviors, (3) included skills building (e.g., correct condom use, role-playing disclosure), (4) delivered to individuals versus groups, (5) delivered in primarily HIV/AIDS settings, (6) were more intensive and over a longer duration (i.e., more than ten sessions over three months), (7) delivered by professional mental health or health care providers, and (8) addressed issues relevant to coping with HIV (e.g., medication adherence, mental health).

Currently, the NIMH is conducting a project evaluating the use of motivational interviewing techniques to promote risk reduction in PLH (Schreibman & Friedland, 2003). This project, entitled the Options Project, uses strategies at every clinic visit to assess risk behaviors, rate the importance of changing and confidence in changing behaviors, and discuss prevention strategies to reduce the risky behaviors. Preliminary evidence suggests this program is effective in reducing risk behaviors between visits.

However, although research has demonstrated support for the efficacy of risk reduction programs, there are two problems that decrease the feasibility of their use within health care settings. First, the programs employ specialized risk reduction counselors that have been trained to provide these services, and two, the programs are fairly time intensive. Risk reduction messages and programs may be more widely disseminated in health care clinics if they were provided by health practitioners who have the most contact with patients, and incorporated into the routine of patient visits (Rio, 2003). The medical setting may be the only place where PLH have contact with others who can educate them about HIV prevention, and HIV-positive patients tend to view

clinicians as a trusted source of prevention information (Gerbert, Maguire, & Sumser, 1991).

The CDC recognized the need for provision of prevention services by practitioners, and as a result, public health initiatives have developed framework for addressing secondary HIV prevention. For example, in 2001 the CDC released a plan for HIV primary and secondary prevention entitled the “HIV Prevention Strategic Plan Through 2005.” As part of this plan, the Serostatus Approach to Fighting the HIV Epidemic (SAFE) strategy was developed, which called for efforts to increase the accessibility of prevention services for PLH, increase risk reduction counseling facilitated by health care practitioners, and to increase prevention messages given by health care providers (Janssen et al., 2001).

Following the release of the strategic plan, after stimulating research into the viability of these goals, the CDC, Health Resources and Services Administration (HRSA), the National Institutes of Health (NIH), and the HIV Medicine Association of the Infectious Diseases Society of America (2003) released a set of evidence-based recommendations for the incorporation of secondary prevention into the medical care of PLH. These recommendations were developed in line with the belief that medical care practitioners play a key role in promoting risk reduction practices by screening for risky behaviors and discussing topics such as sex and drug use, delivering prevention messages, positively reinforcing changes in behavior, providing referrals for services such as substance abuse treatment, facilitating partner notification of serostatus, and identifying and treating other STDs. As described in the report, these recommendations can be enacted with a “feasible” level of effort by incorporating them into practice

guidelines, educating employees in managed care clinics, and providing educational materials (e.g., pamphlets) and preventative materials (e.g., condoms).

Despite CDC efforts to increase the provision of secondary prevention messages in managed care settings, risk reduction counseling is routinely provided by less than two thirds of providers (Marks et al., 2002; Metsch et al., 2004), even though many providers believe it is necessary and part of the job (Cohen, Halvorson, & Gosselink, 1994). For example, Marks and colleagues (2002) interviewed 839 PLH from six public clinics in California to determine if clinic providers had ever discussed safe sex or disclosure of serostatus to partners. Although the majority of respondents indicated that their physicians had discussed safe sex, 29% indicated that providers had never mentioned safe sex practices. Furthermore, 50% reported that physicians had never discussed disclosure of serostatus to sexual partners. In this study, MSM and white participants were less likely to receive prevention messages than heterosexuals and participants of black/mixed ethnicity.

Many barriers exist in medical settings that prevent dissemination of risk reduction messages by medical staff. Commonly cited barriers include belief that attempts will not be useful, belief that patients are not at risk, lack of standardized risk assessment tools, and lack of training regarding sex and drug use behaviors (Rio, 2003; Schreibman & Friedland, 2003; CDC, 2003). Many clinicians are also reluctant to discuss taboo topics like sex or drug use with patients, although evidence suggests that patients will often disclose risks when asked, and rate their clinician's ability to provide care as higher when asked about these taboo topics (Gerbert et al., 1999; Gerbert, Macguire, & Coates, 1990). Time and resource constraints are also frequently cited barriers to

disseminating health prevention messages, as many physicians feel like they have too many other topics to discuss in the short time spent with that patient (e.g., treatment adherence, health maintenance; see review by Rio, 2003; Schreibman & Friedland, 2003; CDC, 2003).

Furthermore, other barriers to providing risk reduction counseling maybe related to patient characteristics. Physicians may be less likely to discuss risk reduction with patients who have been HIV-positive for longer periods of time, rather focusing on patients who are newly diagnosed. Other characteristics such as language barriers, difficulty obtaining HIV medications, and difficulty accessing medical/mental health resources may preclude a physician from discussing risk reduction, rather focusing on these issues (Colfax et al., 2004; Fawzi et al., 2006; Metsch et al., 2004).

Accordingly, with the multiple barriers that exist in medical settings that prevent dissemination of risk reduction messages by medical staff, other methods of communicating these messages is necessary. As emphasized by the 2003 recommendations released by the CDC, HRSA, NIH, and the HIV Medicine Association of the Infectious Diseases Society, clinic or office environments where PLH are treated be can “structured to support and enhance prevention.” This includes the use of preventative and educational material readily accessible to patients, such as posters and pamphlets, placed in the clinical setting. Repetitive prevention messages encountered throughout the patient’s appointment “reinforces their importance, increasing the likelihood they will be remembered” (CDC, 2003). With the rapidly changing HIV/AIDS medical research base concerning prevention and treatment, written educational materials placed throughout the clinic may especially be helpful for those patients who have been

HIV-positive for longer periods of time and receive fewer risk reduction messages from physicians.

For example, consider the relatively new research findings concerning the risk of superinfection. As discussed previously, with the novelty of this phenomenon coupled with the increasing rates of transmission of drug-resistance viruses, it is evident that knowledge regarding superinfection has not reached or impacted many PLH. Superinfection disputes the commonly held belief that engaging in UAI or sharing needles with another PLH poses few or no risks (see review by Kalichman et al., 2000), and as demonstrated by Colfax and colleagues (2004), a significant proportion of PLH may have no knowledge of the phenomenon of superinfection, doubt its existence, and/or demonstrate lack of concern. In situations in which physicians are not able to screen for risky behaviors, provide information about the risks of UAI and drug use, and discuss prevention practices, written prevention messages placed in clinical settings may help to disseminate information regarding superinfection (CDC, 2003). In turn, improved knowledge about the incidence and consequences of superinfection could encourage HIV-positive MSM to practice risk-reduction behaviors.

Written educational materials, such as pamphlets and posters, have been used in clinical settings for decades with the goal of facilitating preventative health behaviors. Public health and media campaigns help facilitate these preventative health behaviors by communicating information and messages about health (CDC, 2005). Years of research show that encouraging healthier lifestyles and risk reduction can prevent disease and improve the health of people who experience common medical conditions such as heart disease, STDs, etc. These campaigns are sometimes designed with the purpose of

inducing high levels of negative affect in order to increase the “impact and accessibility” of the message (Hill, Chapman, & Donovan, 1998; Sutton, 1992). In other words, viewing a threatening health message in turn leads to an emotional reaction as the listener considers the harmful consequences of engaging in the behavior portrayed in the message (see review by Leventhal, 1970). Theoretically, complying with the behavior change introduced by the message (e.g., using condoms) would reduce the negative affect experienced by the viewer, and thus, the purpose of the message would be fulfilled. However, these media campaigns do not always have the intended effect on individuals’ health-related behaviors. For example, there is a continued rise in the rate of STDs diagnosed every year, despite public health efforts to educate the public about engaging in safe sex practices. Similarly, consider the massive anti-HIV/AIDS media campaign beginning in 1987 that relied on every medium of media to communicate prevention messages (CDC, 1991). Although a decrease in the transmission rate of the disease has been observed, 40,000 new infections still occur yearly (CDC, 2006). Thus, prevention messages may not have the intended effect of decreasing risky behaviors across all viewers.

Research has sought to identify factors that influence a viewer’s reaction to threatening health messages, with one factor that is consistently identified in social psychology research is the tendency to engage in defensive processing upon viewing a threatening health message (Ditto & Lopez, 1992; Liberman & Chaiken, 1992; Kunda, 1987). When individuals receive self-relevant information that is inconsistent with current preferences, opinions, or behaviors (such as a threatening health message), they show a greater tendency to be critical of the information than if the message contains

information that is consistent with individual preferences, opinions, or behaviors. As such, the individual engages in defensive processing of the threatening information by questioning the research behind it, doubting the validity of it, or applying it in a way that is more self-serving. This phenomenon has been referred to with a variety of different names (e.g., motivated inference, motivated skepticism, motivated reasoning, self-serving biases), but for the purposes of the current study, it will be referred to as defensive processing or defensive bias.

Defensive Bias

As suggested by Kruglanski (1980, 1990) and Pyzczynski and Greenberg (1987), the tendency to engage in defensive processing in response to inconsistent or threatening information may be motivated by a self-preservative quality. When information received is consistent with past assumptions, an individual does not need to generate alternative hypotheses, and thus the congruent information is processed without question. The tendency to view preferred information as more valid helps the individual maintain a positive self-image as a rational and informed person. However, when threatening information is presented that is incongruent with past assumptions or behaviors, an individual may feel inclined to engage in an extensive search for alternative explanations in order to maintain this positive self-image. In other words, when an individual is confronted with information that holds unfavorable outcomes, they are more likely to conduct a mental search of alternative options, generate multiple hypotheses that challenge the incongruent feedback, and devote more energy in processing the information. As a result, the individual may display a defensive response to the new

incongruent information, in an attempt to search for information that is more congruent with previous expectancies.

A review by Ditto and Lopez (1992) illustrated the prevalence of defensive processing in multiple situations, whether the information concerns one's intelligence (Wyer & Frey, 1983), social sensitivity (Pyszczynski, Greenberg, & Holt, 1985), personal values (Lord, Ross, & Leppler, 1979) or performance in school (Kunda, 1987). Furthermore, individuals also respond defensively to health messages with threatening content. When presented with a message that is incongruent with a health behavior (e.g., an anti-smoking ad viewed by a person who smokes), individuals often engage in a range of defensive behaviors to protect self-image, including discounting the importance of the threat, coming up with different ways to interpret the information, and attacking the credibility of the threatening information (Croyle and Sanda, 1988; Ditto et al., 1988; Ditto & Lopez, 1992; Jemmott et al., 1986; Kunda, 1987; Leffingwell et al., 2007; Liberman and Chaiken, 1992). In turn, this defensively biased interpretation of relevant health information can prevent adaptive changes in health behavior.

Research efforts have attempted to identify the mediating processes of the defensive response. One identified factor is that of message relevance. A series of studies conducted by Kunda (1987) illustrated that people are more likely to scrutinize a health message for fault when it is incongruent with their own health behaviors than people for whom the message is not personally relevant. In these studies, heavy and low caffeine drinkers were provided false information linking caffeine intake to fibrocystic disease, which was said to lead to breast cancer. Results indicated that heavy caffeine drinking women were more skeptical of the evidence than low caffeine drinking women and men.

In other words, participants who were more apt to suffer personal repercussions if the evidence were true were more likely to implement a face-saving strategy by engaging in defensive processing and attacking the credibility of the message.

In an extension of Kunda's (1987) research, Liberman and Chaiken (1992) examined the impact of high versus low threat messages presented to individuals in high relevance versus low relevance conditions. They used the same paradigm described by Kunda (1987) involving the link between fibrocystic disease and breast cancer. They found that when presented with relevant health messages (regardless of how threatening the message is), individuals were likely to show defensive systematic processing of threatening information by questioning threatening information more than encouraging information.

In addition to message relevance and degree of threat, other factors that may mediate the process of defensive responding have been identified, such as perceived disease prevalence (Jemmott et al., 1987), impact of symptoms (Croyle & Sanda, 1988), and severity of outcomes associated with the disease (Ditto et al., 1988). Overall, these studies have found that the more rare and incurable a disease is perceived to be, the more likely an individual is to engage in defensive processing and deny the seriousness of the disorder. Additionally, individuals tend to engage in defensive responding even when the threat involves that of a familiar disease, such as heart disease (Croyle, Sun, & Louie, 1993). Finally, defensive responding also occurs in response to information about risky behaviors, such as alcohol use (Leffingwell et al., 2007).

Specific to the current study, defensive responding of threatening health information regarding the risk of superinfection was anecdotally reported in the study by

Colfax and colleagues (2004), as discussed earlier. In this study, many participants indicated having previously heard of phenomenon of superinfection and the health risks associated with it. However, one-third of these men displayed a defensive reaction to the information and disagreed it was possible or reported that they were not concerned about superinfection. As a result, these men continued to engage in risky sex practices. In this study, men for whom the message was highly relevant (i.e., MSM who engaged in UAI) engaged in defensive processing of the threatening information regarding superinfection. Similar themes of defensive processing in response to messages about superinfection were observed in the narrative studies conducted by Davis and colleagues (2002) and Adam and colleagues (2005) discussed earlier.

In summary, the aforementioned studies are illustrative of the natural tendency of people to respond defensively to information that is incongruent with one's beliefs, values, or behaviors. This defensive response may be motivated by the need to maintain the idea of oneself as a rational and informed person. In the case of health behaviors, the natural tendency employed to discount the significance of a threatening health message may be face saving in that the discrepancy between one's behaviors (e.g., UAI) and reported negative outcomes (e.g., STDs, HIV) can be minimized or resolved. However, allowing beliefs about current health behaviors to bias evaluation of novel and relevant health information may have a negative effect in the long run (such as discounting a message about cancer being caused by cigarette smoking). This defensively biased interpretation of relevant health messages can prevent adaptive changes in health behavior. Thus, individuals for whom health care messages are geared towards may be the least likely to accept them. For this reason, it is important to reduce the tendency to

engage in defensive processing and identify ways to make health messages more meaningful and salient.

Identifying characteristics of people who are more likely to defensively process information may help to frame health messages in ways that increases the salience and believability of the message. One such characteristic may be an individual's perceived control over behaviors and risk factors that lead to negative health conditions. For example, a person who perceives a negative event as controllable by personal actions may process a threatening health message differently than an individual who believes the health condition to be caused by factors outside of one's control, such as by chance or luck. Specifically, if a negative event (e.g., transmission of drug-resistant virus) is perceived as controllable by personal actions (e.g., condom use), a person may be more likely to engage in defensive responding when confronted with messages that are incongruent with current health behaviors. In other words, a health message may be more anxiety-provoking to an individual who believes that a negative condition is controllable because the image of the self as a rational and competent individual is threatened (Aronson, Cohen, Nail, Harmon-Jones & Mills, 1999; Kruglanski, 1980, 1990; Pyszczynski & Greenberg, 1987). Upon presentation of the health message, the person is thinking, "Not only am I stupidly engaging in a behavior that has been shown to hurt my health, but I am the only one who can change this." This threatened self-image could lead to defensive processing of the information, in order to avoid anxiety about behaviors. In questioning or doubting the negative feedback, the individual may fail to change risky behaviors that led up to the diagnosis.

Conversely, a person who believes the health condition as caused by factors outside of one's control (e.g., due to fate or chance) does not experience the threat to self image because the condition cannot be prevented by personal action. As a result, the individual may not be as driven to engage in defensive processing to avoid negative self-evaluation. Identifying client's perceived control over negative health events may help physicians, public health efforts, and media campaigns to pitch threatening health information in a way that would minimize the immediate defensive response.

In sum, the presentation of a threatening health message may have a different impact on individuals who perceive health to be ultimately under their own control, versus individuals who believe that health is outside their control. Specifically, when a threatening health message regarding the risks of superinfection is presented to HIV-positive MSM, individuals who believe that their health is controllable may have a different response to the message than individuals who attribute their health to outside factors, such as luck. In other words, perceived controllability of health may be a potential moderator in defensive processing. The purpose of the current study was to determine if the tendency to view health events as inside or outside one's personal control is related to the tendency to engage in defensive processing upon presentation of a threatening health message. In this study, perceived controllability was examined using Wallston and Wallston's (1978) health locus of control model.

Health Locus of Control

Many health interventions are designed with the idea that people who believe they have control over their health will be more likely to take steps to promote their health, such as not smoking, exercising, etc. (as reviewed by Bell et al., 2002; Stickland, 1978;

Wallston & Wallston, 1978). Therefore, the ultimate goal of many health interventions is to help people to realize that because their health is under their own control, personal behaviors can be modified to promote health. However, research has demonstrated that many people attribute their health to outside sources, such as their doctor, to luck, or to fate. Consequently, research has sought to predict how likely an individual is to engage in healthy behaviors by identifying the degree of control over health that individuals perceive to have, otherwise known as “Health Locus of Control” (HLC). This area of research has its roots in Rotter’s (1954) social learning theory, which focuses on the role of expectancy beliefs in promoting behavior in specific situations. Rotter (1954) hypothesized that these expectancy beliefs can be generalized over many situations, according to reinforcement in previous situations. With the creation of a locus of control scale, he was able to distinguish between individuals who generally believe that events are a result of their actions (“internals”) and individuals who generally believe that events are a consequence of outside influences that cannot be controlled (“externals;” Rotter, 1966).

Extending these ideas to a health perspective, it seems that internals would be more likely to take responsibility and engage in behaviors that would promote their health. Wallston and Wallston (1978) developed the Multidimensional Health Locus of Control Scale (MHLC) in order to examine locus of control in the prediction of health behavior. The MHLC scale measures dispositional expectancy beliefs regarding health along three dimensions: the extent to which individuals believe their health is a result of their own actions (internal HLC), the extent to which individuals feel their health is under

the control of powerful others, such as physicians (powerful others HLC), and the extent to which individuals believe their health can only be explained by fate (chance HLC).

Research with this scale has revealed a positive relationship between health locus of control and preventative health behaviors. For example, Slenker, Price, and O'Connell (1985) found that joggers were more likely to score higher on the internal scale than non-exercisers, and Carlson and Petti (1989) found that college students with high internal locus of control were more likely to report exercising. Shope, Copeland, Maharg, and Dielman (1993) found that adolescents with better alcohol refusal skills and less reported alcohol use had higher internal health locus of control than peers. Bundek, Marks, and Richardson (1993) found that internal HLC was the most powerful predictor of the frequency of breast self-examination in a sample of Hispanic women. Bell and colleagues (2002) found that older adults with an internal HLC were more likely to limit sugar intake, get adequate sleep, and have a smoke detector in the house. Additionally, in this study higher internal HLC scores were associated with higher levels of physical functioning and reports of better health. Overall, these findings demonstrate the importance of HLC beliefs in practicing healthy behaviors.

The MHLC scale has also been used with a HIV-positive population. Research has shown that PLH often score higher on the internal and powerful others HLC scales than the chance HLC scale (Evans et al., 2000; Molassiotis et al., 2002; Preau et al., 2005; Ubbiali et al., 2008). It appears that PLH are largely aware of how their behaviors (e.g., treatment adherence, risk reduction) have an impact on subsequent health. Furthermore, high scores on the powerful others scale illustrates the impact of physician advice and directives on PLH health beliefs. Other studies involving the HIV-positive

population have linked HLC to preventative behaviors. Evans and colleagues (2000) found that high scores on the powerful others subscale was related to the decision to begin ART. They also found that MSM who had higher chance HLC scores were more likely to report life-related distress. Similarly, Preau and colleagues (2008) found that higher chance HLC scores were related to more negative perceptions of health-related quality of life, while high internal HLC scores were related to better perceptions of health. Kelly and colleagues (1990) found that gay men who engaged in UAI had higher scores on the chance HLC scale and lower scores on the internal subscale, reflecting the belief that infection with HIV is not so much due to personal control but is rather a function of luck.

In sum, many health interventions are designed with the idea that people who believe they have control over their health will be more likely to take steps to promote their health. Research using Wallston and Wallston's (1978) MHLC has linked perceived controllability of health to preventative health behaviors, showing that people with higher internal HLC are more likely to engage in behaviors that are conducive to healthier living (e.g., exercising, alcohol use). More specific to the current study, research using the MHLC has demonstrated that PLH tend to obtain higher scores on the internal and powerful others subscales, and these scores are positively related to overall physical and mental functioning, decisions to begin ART, and practicing preventative behaviors such as safer sex.

Given the relationship between health locus of control and preventative health behaviors, it may be possible to match health messages to patient's locus of control. Particularly, receiving health recommendations consistent with an individual's HLC may

lead to an increased reduction in risky health behaviors. For example, Williams-Piehota and colleagues (2004) demonstrated that matching health messages regarding the risk of breast cancer to individual HLC beliefs led to a higher likelihood of obtaining a mammogram than receiving HLC inconsistent information. Similarly, Quadrel and Lau (1989) found that matching the language of a breast self examination (BSE) promotional message to individual HLC increased the likelihood of later BSE behaviors. Thus, health messages presented in terms of individual HLC may be more effective in initiating health change behaviors. For example, an individual who has high internal HLC may be more likely to do a breast self-exam when the message emphasizes an individual's control in preventing cancer by engaging in BSE. However, the mechanism of action behind this finding has not been identified. It may be that receiving HLC-consistent health messages reduces the tendency to engage in defensive processing, leading to changes in health behaviors. However, a review of the literature revealed a lack of previous research examining the relationship between defensive bias and HLC.

Present Study

The purpose of the current study was twofold. The first goal was to determine if a message regarding the threat of superinfection evokes defensive processing in a sample of HIV-positive patients who receive services in an internal medicine specialty clinic. It was predicted that when threatening health messages about superinfection are presented, defensive processing in individuals for whom the message is highly relevant (i.e., MSM who engage in UAI or men who share needles) would occur significantly more than in individuals for whom the message is irrelevant. The second purpose of the current study was to determine if HLC is related to the tendency to engage in defensive processing,

after reading a threatening health message that links UAI/sharing needles to the incidence of superinfection. It was hypothesized that individuals with high internal HLC beliefs will be more likely to engage in defensive processing than individuals with low internal HLC beliefs, due to the difference in perceived controllability of the disease. Additionally, it was hypothesized that individuals with high scores on the HLC chance scale would be less likely to engage in defensive processing than individuals with low chance HLC beliefs.

CHAPTER III

METHODS

Design and Procedure

Participants were recruited from the lobby of an internal medicine specialty clinic within a university hospital in a south central city. While waiting to be called to an exam room, patients were approached by the research coordinator and asked if they would like to participate in a study examining beliefs and attitudes regarding HIV transmission behaviors. Patients were told that participation will take no more than 45 minutes, and they would be compensated \$10 for their time. Those who expressed interest in the study were asked to sign a consent for participation form delineating the purpose and risks of the study, and a notice of privacy practices form (in line with the 1996 Health Insurance Portability and Accountability Act) that allowed the researcher to access pertinent health information (i.e., CD4 count and viral load).

After signing informed consent and HIPAA, participants completed a packet of measures, including the demographics form, the Risk Assessment Survey, the HIV/AIDS Risk Knowledge Scale, the MHLC, and questions examining pre-experimental beliefs regarding the risk of superinfection. These measures are described below. Participants then read an article linking risky sexual and drug use behaviors to the incidence of

superinfection (termed “reinfection” in the article). This article was adapted from two peer-reviewed sources, (1) a fact sheet released by an advocacy group for people living with HIV/AIDS (Project Inform, 2003), and (2) an article posted on a well-known HIV/AIDS educational website (Kaiser, 2006). This article first describes how “reinfection” occurs and presents research refuting and confirming the risk of reinfection. The article then lists reasons why PLH should reduce risky sexual and drug use behaviors (i.e., reduce chances of superinfection or transmission of other diseases), and recommendations on reducing one’s risk of superinfection are described (i.e., using condoms; Appendix B).

The information presented in the article was considered high or low threat depending on how relevant it was to the reader. Participants who endorsed a history of engaging in UAI and/or sharing needles while using drugs were considered to be in the high threat condition; participants who did not have unprotected sex or use drugs were expected to experience low threat or no threat at all. Thus, men for whom the article was more relevant were expected to be less willing to believe the article than men for whom the information is less threatening. After reading the article, participants then answered a series of questions designed to capture the attitudes and beliefs about the risks of superinfection (i.e., post-experimental beliefs). These questions served as the primary dependent variables in this study, and are described below (Appendix C). Finally, after completing these measures, participants were paid \$10 for their time, thanked, and dismissed.

Measures

Upon consenting to participate in the study, participants were asked to complete a packet of paper consisting of the following measures.

Demographics. All participants were asked to provide demographic information, including questions about age, ethnicity, income, sexual orientation, etc. Participants were also asked to report their current CD4 count and viral load, and if they were currently taking HIV-related medications. Additionally, similar to the study conducted by Fawzi and colleagues (2006) examining HIV transmission knowledge, questions were included that assessed for a history of sexual abuse, mental health problems, or commercial sex work, and length of time that HIV status was known (Appendix A).

Risk Assessment Survey. Participants were asked to complete an HIV risk assessment survey. This scale includes questions regarding sexual behaviors and drug use behaviors exhibited in the past three months. Specifically, the questions regarding sexual behaviors screen for (1) gender(s) of sexual partner(s), (2) number of sexual partners, (3) type of sexual activity (e.g., oral, anal), (4) frequency of condom use, (5) whether the partner(s) had HIV, other STDs, or used drugs, (6) if the sexual activity occurred while using drugs, and (7) if the sexual activity occurred without disclosing one's HIV status. Questions specific to drug use behaviors screen for (1) intravenous drug use, (2) whether the needles were new or sterilized, (3) frequency of sharing needles or other injection equipment, and (4) if others that the client shared needles with were HIV positive (Appendix A). Participants were familiar with this survey as it is administered to all new patients seeking services in this clinical setting. Thus, although the information required

by these questions is considered to be sensitive and private, familiarity with this survey was hoped to promote honesty.

Similar to analysis methods reported by Saewyc and colleagues (2006) in their study of adolescent sexual risk behaviors, responses from the risk assessment survey were tallied to form an overall “superinfection risk score.” This score was created using seven behaviors reported on the HIV risk assessment survey that have been linked to the incidence of superinfection: (1) number of sexual partners, (2) type of sexual activity, (3) how often protection was used, (4) if the sexual partner(s) was seropositive, (5) whether the partner(s) had a STD, (6) if the IV drug user indicated sharing intravenous drug use equipment, and (7) if equipment was shared with a seropositive person. Responses to these questions were weighted based on research regarding the relative risk of contracting HIV according to sexual/drug-use behaviors (see below for more information). The following guidelines were used to tally the superinfection risk score:

Risk Behavior	Response Scoring
<i>Sexual behaviors:</i>	
1. Number of sexual partners*	number of partners x 100 =
2. Type of intercourse	anal = 500 vaginal = 100 oral = 25 both oral & anal (male)= 500 both oral & vaginal (female) =100
3. How often protection was used	always = 25 sometimes = 100 never = 200
4. Serostatus of sexual partner(s)	HIV+ = 200 HIV- = 0 unknown=200 both HIV+/- = 200
5. Whether partner(s) had an STD	yes = 200 no = 0 unknown = 200
<i>Intravenous drug use behaviors:</i>	
6. Frequency of sharing drug use equipment*	always = 200 sometimes = 100 never = 0
7. Serostatus of drug use partner:	HIV+ = 200 HIV- = 0 unknown=200

* participants who denied engaging in this behavior were instructed to skip that series of related questions scored as system-missing in data set

In formulating the scoring guidelines listed in the above grid, behaviors that place PLH most at risk for experiencing superinfection were assigned the highest number of points (i.e., 200 or 500), with no-risk to low-risk behaviors assigned smaller weights (i.e., 25). First, participants who indicated having sexual intercourse over the past three months were considered to have experienced some degree of risk (i.e., 100 points), with this risk rating varying according to number of partners. Weights assigned to type of sexual contact also varied, with oral sexual contact weighted as relatively low-risk (i.e., 25 points). Although not impossible, the relative risk involved with contracting HIV through oral contact is low, with previously documented cases involving the presence of lesions or sores in both the mouth and on genitalia (SAMHSA, 2002).

Vaginal sexual contact was weighted as having a significantly higher risk for exposure to HIV (i.e., 100 points) than oral sexual contact. According to a review published by SAMHSA (2002), the tissues of the vagina are mucosal, thus containing infected human body fluids. Vaginal tissues can be easily injured during intercourse, and consequently allow for release of infected fluids. Albeit risky, vaginal intercourse was rated as less risky than several other behaviors in the questionnaire (e.g., lack of condom use, sharing drug equipment) because the skin of the penis is not as easily damaged as other genitalia. In fact, female-to-male transmission of HIV is eight times less likely to occur than in the reverse situation (SAMHSA, 2002).

Moreover, research estimates that the likelihood of contracting a different strain of HIV by engaging in UAI is five times higher than engaging in vaginal intercourse (SAMHSA, 2002). In particular, similar to vaginal tissue, the tissues of the anus/rectum

are also mucosal and contain a high concentration of infected fluids. However, anal/rectal tissues are even more prone to breaks, abrasions, and bleeding during sexual activities (SAMHSA, 2002; CDC, 2006), with this risk especially relevant to the receiver of UAI. Thus, for the purposes of the superinfection risk score, UAI was assigned 500 points (i.e., five times the weight for vaginal intercourse).

Of note, participants were also allowed to indicate the option of “anal and oral” intercourse with male partners, or “vaginal and oral” with female partners. However, these options were *not* weighted to include the sum of both forms of sexual contact (e.g., oral + anal = 525 points). Rather, only the weight for the riskier behavior was maintained (i.e., 100 for vaginal, 500 for anal), as research indicates that for newly diagnosed cases of HIV in couples who report multiple forms of unprotected, sexual contact (e.g., oral and vaginal), identifying the exact source of transmission not only often unnecessary, but also often impossible (SAMHSA, 2002). Also, the risk of HIV transmission associated with *unprotected*, genital-to-genital contact is so much higher that it essentially subsumes the risk of oral transmission of HIV (i.e., in couples who indicate engaging in both behaviors).

In addition to number of partners and type of sexual contact, three additional questions related to risky sexual behaviors were included in computing the superinfection risk score. Each of the following behaviors were weighted with 200 points: (1) engaging in intercourse with a seropositive partner or partner of unknown serostatus, (2) “never” using condoms or other means of protection, and (3) engaging in intercourse with a partner who has an STD or may have an STD. Although it is easy to deduce reasons for including the first two questions as superinfection risk factors, reasons for inclusion of

the latter question may not be as apparent and further explanation may be warranted. Specifically, research shows that the presence of a STD in either partner (of the MSM dyad) significantly increases the chances of HIV superinfection (SAMHSA, 2002). Many STDs are manifest through lesions or inflammation on the genitals. Tissue disturbances such as these lead to an influx of both helper CD4 cells (for healing) and HIV cells migrating to that area. Thus, a higher concentration of HIV cells are easily passed to one's partner, while the higher concentration of helper CD4 cells allows for a partner's HIV cells (i.e., present in semen and blood) to have easy access to the very cells targeted by the virus (CDC, 2006).

Finally, two questions related to risky IV drug use behaviors were also included in computing the superinfection risk. Research shows HIV can survive outside the human body for a short amount of time as long as it is protected by bodily fluids like blood, semen, etc. In the case of IV drug use, minimal amounts of blood containing the live virus can survive not only in pre-used syringes, but also in drug cookers, filters, cotton, rinse water, and the actual prepared drug. In the current study, responses indicating a high frequency of risky IV drug use behaviors (i.e., "always" sharing needles or other drug use equipment) were weighted with 200 points. Responses indicating some degree of risk ("sometimes") were weighted with 100 points.

HIV/AIDS risk knowledge scale. Next, participants completed a 22-item questionnaire specific to HIV/AIDS transmission knowledge. The items on this questionnaire were used in the study conducted by Fawzi and colleagues (2006), originally derived from scales developed by Kelly and colleagues (1989) and Morton and colleagues (1996). Examples of questions include "Only homosexual men can become

infected with HIV” and “Someone can have a negative HIV test and still have the virus” and “If someone is infected with HIV, uses injection drugs and shares needles, he/she can spread HIV.” Participants respond to the questions by marking either “true” or “false.” For this measure, a questionnaire copying error resulted in an incomplete copy of the first page, which contained items 1-10 of this scale. Specifically, item 10 on this page only allowed the possible response option of “true.” Accordingly, 97% of the participants chose “true,” with two participants who wrote “false” (or “f”) and one participant who left it blank. Although the correct answer was “true,” the validity behind the participants’ responses cannot be ascertained and therefore, this item was not included in analyses.

Additionally, in the current study three questions specific to HIV superinfection were added to the scale, including “It is safe for two people who have HIV to have unprotected sex or share needles, as long they have no other STDs or viruses that can be transmitted” and “If a person who is HIV-positive has unprotected sex or shares needles with another person who is HIV-positive, transmission of drug-resistant viruses can occur (also known as superinfection or reinfection)” and “If two HIV-positive people have an “undetectable” viral load, it is safe to have unprotected sex or share needles.” These questions were included in order to identify participants with previous knowledge related to the risks of superinfection (Appendix A).

Previous use of the HIV Knowledge Scale in research settings with seropositive populations has resulted in “good” reliability and validity estimates (Fawzi et al., 2006; Kelly, St. Lawrence, Hood, & Brasfield, 1989; Morton, Nelson, Walsh, Zimmerman, & Coe, 1996). Fawzi and colleagues (2006) adapted questions from these scales for the sake of brevity and understandability, and found good reliability in their study ($\alpha = .84$). For

the current study, reliability analyses for the original 22-item scale (including item 10) indicated an adequate reliability estimate ($\alpha = .65$), although notably lower than reliability demonstrated in the original study.

Reliability analyses were then conducted on the full 25-item scale (including item 10 and the three superinfection questions) was somewhat higher, with an alpha coefficient of .69. Examination of the corrected item-total correlational value table revealed a negative, weak relationship between item 10 and the total scale score ($r = -.03$). This weak correlational value suggests that item 10 may in fact be measuring something different than from the instrument as a whole, and provides further support for the decision to remove item 10 from additional analyses. Once removed, final reliability analyses for the full 24-item scale (excluding question 10) evidenced a slightly higher alpha coefficient that was more indicative of adequate internal consistency ($\alpha = .70$).

Pre-experimental beliefs. Next, participants were asked to indicate their opinions regarding the seriousness of the threat of superinfection, perceptions of how at risk they are for contracting a drug-resistant virus, and how important it is to change their behaviors in order to avoid the risk of superinfection. Answers were on 6-point Likert-type scale ranging from not at all serious/at risk/important (1) to very serious/at risk/important (6). These questions were included to control for previously held beliefs regarding superinfection (Appendix A).

Multidimensional Health Locus of Control Scale (MHLC). Participants then completed the Multidimensional Health Locus of Control Scale, form A (Wallston & Wallston, 1978). This scale includes questions related to the three dimensions of health locus of control: internal control, powerful others external control, and chance external

control. The internal control scale refers to the belief that one's health is a direct result of one's own behaviors. Sample items include "If I get sick, it is my own behavior which determines how soon I get well again" and "If I take care of myself, I can avoid illness." On the other hand, the chance scale refers to the tendency to attribute health to things such as luck or chance. Examples include, "Luck plays a big part in determining how soon I will recover from an illness" and "No matter what I do, I'm likely to get sick." Finally, the powerful others scale refers to the expectation that doctors and other health professionals determine health. Sample items include "Whenever I don't feel well, I should consult a medically trained professional" and "Having regular contact with my physician is the best way to avoid illness." Responses vary according to a six-point Likert-type scale, ranging from strongly disagree (1) to strongly agree (6). The HLC scale has been found to have "adequate" reliability and "satisfactory" validity (Norman & Bennett, 1996; Appendix A).

In the current study, four participants did not complete the last three items of the scale, as these items were listed on the back side of the page. Mean imputation was used to replace these missing values, and participant data points with either (a) more than one missing value on each dimension of the scale, or (b) more than 10% of the data missing, were not retained in remaining analyses ($n = 1$). Similar to reliability estimates reported by Norman and Bennett (1996), reliability analysis using all of the items comprising the HLC scale indicated the measure to have adequate internal consistency ($\alpha = .65$). Furthermore, reliability analyses conducted on items comprising the chance and powerful others external control dimensions yielded similar alpha coefficients ($\alpha = .65$ and $.64$, respectively), indicating an adequate degree of internal consistency. Finally, the internal

locus of control dimension was found to possess the highest degree of internal consistency, obtaining a Cronbach's alpha coefficient of .80.

Post-experimental beliefs. The post-experimental attitude measures were designed to capture the attitudes about the risk of superinfection and perceived importance of the problem, personal risk perception, and degree of scientific scrutiny about the reported link between engaging in UAI/sharing needles and transmission of drug-resistant viruses. These variables were modeled after those used in studies by Leffingwell and colleagues (2007) and Sherman and colleagues (2000). The first set of questions asked for opinions regarding the association between UAI/sharing needles and superinfection, degree of seriousness the effects of engaging in risky sexual and drug use behaviors are to PLH's health, and how important it is that men who engage in UAI/share needles start practicing safer behaviors. Responses were on a 6-point Likert scale, ranging from not at all serious/important (1) to very important/serious (6).

Participants were then asked to judge the probability of contracting a treatment-resistant virus within the next 15 years and how threatened they felt by the information in the article, responding on a 6-point Likert-type scale ranging from minimal risk/not at all threatened (1) to high risk/very threatened (6). Next, participants were asked to rate the scientific merit of the study and their confidence that the link between UAI/sharing needles and superinfection was scientifically proven, with answer choices ranging from very unscientific/not at all confident (1) to very scientific/extremely confident (6). Finally, participants indicated how convinced they were of the connection between UAI/sharing needles and transmission of drug-resistant viruses on a 6-point scale ranging from not at all convinced (1) to extremely convinced (6) (Appendix C).

A principal components analysis with an oblimin rotation was conducted on the second set of post-experimental beliefs questions and revealed three main components: problem importance, personal risk, and scientific merit. These three components accounted for 69.01% of the total variance. See Table 2 for the measure items and component loadings. The first component, problem importance, is related to the perceived importance of changing risky sexual and drug-use behaviors and the perceived seriousness of superinfection to PLH's health. The second component, personal risk, is related to one's assessment of his own risk and perceived own degree of threat for contracting a drug-resistant strain of HIV. The final component, scientific scrutiny, is related to participants' degree of confidence in the scientific legitimacy of the proposed link between risky health behaviors and the plausibility of experiencing superinfection. Reliability estimates revealed both the problem importance and personal risk components to possess adequate degrees of internal consistency (problem importance $\alpha = .70$; personal risk $\alpha = .61$). However, the scientific merit component demonstrated below satisfactory internal consistency ($\alpha = .21$).

Participants

Sociodemographic characteristics. Participants were 100 males with a mean age of 40.21 years ($SD = 8.84$, range = 19-60). Regarding ethnicity, 62% of the sample identified as Caucasian, 19% identified as African American, 12% Native American, 4% Hispanic, 1% Asian American/Pacific Islander, and 2% indicating "other" or "biracial." The majority of the participants described themselves as "single" (56%), with 26% indicating "partnered, living together" and 9.1% as "married." Over half of participants

identified themselves as “homosexual” (62%), with remaining participants endorsing “heterosexual” (26%) or “bisexual” (10%).

The current sample differed from previous studies in that participants were largely well-educated, bringing in a monthly income, and living in permanent housing (Adams, et al., 2005; Colfax et al., 2004; Fawzi et al., 2006). Specifically, 27% of participants had a college education, with an additional 16% of participants who reported achieving a high school diploma. Despite the higher prevalence of educated participants, over 60% of the sample reported an income comparable to or below the current national poverty threshold, according to the 2010 U.S. Census Bureau report. Specifically, 31% reported a monthly income between 0-\$500 and 32% indicated an income between \$501-1000. Of the remaining sample, 17% reported a monthly income between \$1001-2000, 12% indicated above \$2001, and 8% selected “none,” “unknown,” or “refuse to answer” (see Table 1 for summary of demographic information).

Health characteristics. Participants were asked to self-report the year in which they tested positive and if they were currently on a HAART medication regimen. Of the 100 men who completed the questionnaire, 19.4% of the men indicated being newly diagnosed (within the past two years), 23.5% indicated being aware of their status for 2-5 years, 24.5% reported 5-10 years, and 26.5% indicated knowing for more than 20 years. The majority of the sample (81.7%) indicated they were currently on a combination of prescribed HAART medications.

Results of the most recent CD4 cell count and HIV viral load were also obtained from medical records as an index of participant health. As discussed previously, the CD4 count represents the number of CD4 white blood cells present in a milliliter of blood,

with normal, healthy individuals generally having a count of 500 to 1,400 cells. In the current sample, the average CD4 was 503.65 ($SD = 262.05$), ranging from 41 cells to 1333 cells. The viral load count measures the number of HIV particles per milliliter of blood plasma, representing a measure of the rate at which CD4 cells are being destroyed. In the current sample, most of the participants (71%) had achieved an undetectable viral load, with 14% having less than 5,000 copies, 8% between 5,001-30,000 copies, and 7% having a viral load of 30,000 or more. The high proportion of participants with an undetectable viral load was expected given the high number of individuals on medication. Overall, participants in the current sample appeared to be healthier overall when compared to participants in the study by Halkitis and colleagues (2005). However, these results were expected given the diversity in length of positive serostatus present in the sample, the high number of individuals on medications, and the fact that participants were recruited from an internal medicine clinic specialized in care of HIV/AIDS patients.

Participants were also asked about previous occurrences of mental illness, sexual abuse, and commercial sex work as a measure of health and involvement in risk behaviors (similar to methods reported by Fawzi et al., 2006). Fifteen percent of participants indicated a positive history of sexual abuse, with two men refusing to answer. Regarding mental illness, almost half of the sample (48%) endorsed a positive history of mental health problems such as anxiety, depression, or substance abuse. Finally, 13% of the sample reported involvement with commercial sex work (i.e., either accepting payment or giving payment for sex).

CHAPTER IV

RESULTS

Preliminary Analyses

Risk Assessment Survey. More than half of the participants in the current study indicated engaging in sexual relations within the past three months ($n = 65$). Out of this sexually active group, approximately 71% endorsed having same-sex partners only ($n = 46$), 28% ($n = 18$) reported female-only partners, and one participant endorsed sexual contact with both male and female partners. At the highest risk of superinfection were 15 participants (23.8%) who indicated engaging in unprotected sex with an HIV positive (male or female) partner(s). Comparatively risky, 15.4% ($n = 10$) of sexually active participants reported having sexual contact with partner(s) of unknown serostatus. Only two participants reported engaging in unprotected sex without disclosing one's own serostatus in the past three months. Other than HIV, 12.5% of sexually active participants reported that they had sex with partner(s) who had one or more STDs in the previous month, and 6.2% reported that they did not know if their partner(s) had STDs.

Although MSM in this sample reported engaging in sexual contact with a range of one to four different partners over the last three months, the majority reported sexual contact with only one partner (76.1%, $n = 35$). Regarding type of sexual contact, 61.7% reported engaging in both oral and anal intercourse, with 29.8% reporting only oral sex and 8.5% reporting only anal intercourse. Most MSM in this sample were reportedly aware of their partner(s)' serostatus ($n = 39$), with a total of eight participants (17%) who

denied having awareness of their partner(s)' serostatus. Of those who were aware of their partner's serostatus, 40.4% ($n = 19$) engaged in seroconcordant partnerings and 36.2% ($n = 17$) engaged in serodiscordant partnerings. Lastly, a smaller proportion of participants (6.4%; $n = 3$) reported having multiple HIV positive and negative partners. In response to questions regarding the frequency of condom use, almost half (47.8%) of the MSM reported they "always" used condoms ($n = 22$), 43.5% ($n = 20$) reported using condoms "sometimes," and 8.7% ($n = 4$) reported "never" using condoms.

Similar to trends observed in the MSM, almost all of the participants who endorsed partnering with females (i.e., 18 of 19) indicated that the sexual contact occurred with only one partner (with the exception of one participant who indicated two female partners). Vaginal intercourse was the most common form of sexual contact (94.7%; 18 of 19 participants), with an additional 42.1% endorsing oral sexual contact as well. Furthermore, of this proportion, most men (76.5%, $n = 13$) reported their female partners to be HIV negative, with 11.8% ($n = 2$) indicating seroconcordant partnering and the remainder (11.8%; $n = 2$) reporting that their partner's status was unknown. Most men (78.5%; $n = 15$) reported "always" using a condom, 15.8% ($n = 3$) reported "sometimes" using a condom, and one participant who indicated "never" using a condom.

Of note, when considering both groups together, it appears that the seropositive MSM in this sample engaged in more risky sexual behaviors (i.e., seroconcordant partnerings without using protection) than the seropositive men in the sample who endorsed sexual contact with female partners. However, a bigger proportion of MSM in this sample indicated that their partners were seropositive (40.4%), compared to 11.8% of men who reported their female partners to also be HIV-positive. This suggests that the

decision to engage in risky sexual behaviors may be affected by the sexual partner's serostatus and gender; however, exploratory analyses could neither confirm nor deny these effects due to small cell counts.

Regarding intravenous drug use, 6.3% of the sample indicated having sex with a drug-injecting partner once a week or more in the past three months, 1.6% indicated having sex with a drug-using partner once in the past month, and 14.1% reported they did not know if their partner(s) used injection drugs. A small proportion of the sample ($n = 4$) reported injecting non-prescription drugs, steroids, or vitamins in the past three months. However, 50% of this proportion indicated sharing needles and injection equipment with others of "unknown" serostatus.

Similar to analysis methods reported by Saewyc and colleagues (2006) in their study of adolescent sexual risk behaviors, responses from the risk assessment survey were used to form an overall "superinfection risk score." This score was created using seven behaviors reported on the HIV risk assessment survey that are related to the incidence of superinfection: (1) number of sexual partners, (2) type of sexual activity, (3) how often protection was used, (4) if the sexual partner(s) was seropositive, (5) whether the partner(s) had a STD, (6) if the IV drug user indicated sharing intravenous drug use equipment with another person, and (7) if equipment was shared with a seropositive person (as discussed previously). Responses to these questions were weighted and then tallied to form the overall score, which ranged from zero to 1200 ($M = 359.25$, $SD = 406.63$). Frequency analyses revealed that 35% ($n = 35$) of the sample had an overall risk score of zero, meaning that the participant was not engaging in any behaviors that lead to a risk of superinfection (i.e., no sexual activities or intravenous drug use in the past three

months). Twenty-six percent of the sample reported a higher number of risk factors, with scores more than one standard deviation above the mean.

Correlational analyses were used to examine relationships between participants' superinfection risk score and other demographic variables. Based on previous studies, those with higher-risk scores were expected to report less time since positive diagnosis and have higher viral loads. Although analyses did not reveal a significant relationship ($r = -.01$; $p = .94$) between viral load and risk score, years since HIV diagnosis was found to be inversely related to overall superinfection risk score ($r = -.20$, $p = .05$). Specifically, newly-diagnosed participants reported engaging in more risky behaviors than participants who reported a longer period of time since initial HIV diagnosis. However, it should be noted that when controlling for the number of correlational analyses performed by adjusting the p -value to .001, this correlation was no longer significant.

Independent samples t -tests were also used to detect the presence of relationships between superinfection risk score and past incidence of mental illness, sexual abuse, and commercial sex work (i.e., prostitution). Based on findings reported by Fawzi and colleagues (2006), participants with a history of mental illness (e.g., depression, anxiety), sexual abuse, or commercial sex work involvement were expected to have higher rates of self-reported risky behaviors (i.e., higher superinfection risk scores). However, results did not indicate the presence of any significant differences between participants who either endorsed or denied a history of mental illness [$t(97) = .57$, $p = .57$], sexual abuse [$t(96) = .71$, $p = .48$], or commercial sex work involvement [$t(94) = 1.36$, $p = .17$] on superinfection risk scores. See Table 3 for a summary of test statistics, including group means and standard deviations.

HIV/AIDS risk knowledge scale. The overall HIV transmission knowledge score was calculated by tallying the percent of correct responses out of a total of 24 items, excluding item 10 for reasons described previously. Participants obtained an average score of 22.09 ($SD = 2.14$); answering 92% of the questions correctly. In order to examine associations between the transmission knowledge scale and other categorical demographic variables, the overall scores on this scale were split into “high” scores and “low” scores, based on the mean score of 92% (similar to analyses described by Fawzi et al., 2006). Twenty-eight participants, or 31.1% of the sample, obtained scores below 92% and were considered to have “low” scores. Of note, answers to the additional three reinfection questions were examined to determine prior exposure to knowledge related to reinfection. Frequency analyses revealed correct responses rates of 95% for the first two questions and 97% for the third question, suggesting that the vast majority of the sample had previous knowledge about superinfection and basic understanding of behaviors associated with this risk.

Chi-square analyses were used to identify differences between high and low scorers on the HIV knowledge scale according to demographic variables. Beginning with the variable ethnicity, chi-square analyses revealed more than 20% of the table cells contained frequency counts of less than five (37.5% of cells), thus violating an assumption behind the chi-square test for independence. In order to correct this violation and reduce the number of cells reflected in chi-square analyses, categories comprising the variable ethnicity were collapsed into three categories, including Caucasian (60% of participants), African American (21.1%), and other, non-white ethnicities (18.9%; Hispanic, Native American, Asian, and biracial). A chi-square test of independence using

this collapsed ethnicity variable revealed an association between ethnicity and performance on the HIV knowledge scale ($\chi^2(1, n = 90) = 6.24, p < .05$, Cramer's $V = .26$) (see Table 4). In general, Caucasian participants evidenced higher performance on the HIV knowledge scale, while African American participants performed lower than expected. Non-white participants' performance did not differ significantly from expected counts.

Chi-square analyses were conducted on remaining relevant variables, collapsing categories to increase cell frequency counts when necessary. Results were unremarkable for any significant differences between high and low scorers according to level of education, monthly income, or sexual orientation (see Table 4 for more information). Additionally, independent samples t -tests were used to assess for meaningful differences between high and low scorers on variables of 1) time since HIV diagnosis and 2) total superinfection risk score. Low scorers were expected to report less time since initial diagnosis and more involvement in risky behaviors. However, no statistically significant differences emerged between groups on either continuous variable [time since diagnosis: $t(87) = 1.67, p = .10$; superinfection risk score: $t(88) = 1.13, p = .26$].

HLC scale. Participant response totals on the HLC internal control dimension ranged from 7 to 36 (on a scale of 6 to 36), with an average score of 26.77 ($SD = 6.30$). A histogram generated from score frequencies depicts a positive skew in the data, indicating that most participants believe that their health is generally controlled by their own behaviors. Regarding the HLC chance external control dimension, responses varied between 6 and 36, with a mean score of 17.02 ($SD = 5.73$). Frequency data plotted onto a histogram was slightly skewed to the left, indicating that most participants are less likely

to attribute their health to uncontrollable factors. Finally, responses on the powerful others scale ranged from 6 to 34, with a mean of 21.97 ($SD = 5.84$). A histogram of frequency data resembled a normal distribution of scores, indicating a significant proportion of participants defer to their physician when it comes to health decisions and avoiding illness.

Pre- and post-experimental beliefs. Before reading the article on reinfection, participants responded to three questions designed to capture their attitudes and beliefs related to the phenomenon of reinfection. Specifically, participants assigned ratings to the seriousness of the threat of reinfection, perceptions of how at risk they are for contracting a drug-resistant virus, and how important it is to change their behaviors in order to avoid the risk of reinfection. On average, participants indicated that the threat of reinfection was a serious problem for PLH ($M = 4.98, SD = 1.41$). Participants perceived themselves as being minimally to moderately at-risk ($M = 2.90, SD = 1.74$) for experiencing reinfection, and acknowledged moderate levels of importance ($M = 3.41, SD = 2.21$) of changing their own behaviors to avoid the risk of superinfection.

Participants responded to these same three questions plus three related questions subsequent to reading the article on reinfection. As detailed in the previous chapter, data reduction techniques performed on these six attitude and belief questions revealed the presence of three components. Each component was created by summing the two related factors, resulting in a composite score with answers ranging from two to 12. The first component, problem importance, was related to the perceived importance of changing risky sexual and drug-use behaviors and the perceived seriousness of superinfection to PLH's health. The second component, personal risk, was related to one's assessment of

personal risk and perceived threat of contracting a drug-resistant strain of HIV, and the final component, scientific scrutiny, was related to participants' degree of confidence in the scientific legitimacy of the proposed link between risky health behaviors and the plausibility of experiencing superinfection.

Primary Analyses

Hypothesis 1. It was hypothesized that participants who endorsed engaging in high-risk behaviors over the past three months would evidence defensive processing of the threatening health message about reinfection (i.e., dismissing information, challenging science, minimizing self-risk). In contrast, participants for whom the message was irrelevant (i.e., no risk behaviors) were not expected to show any defensive responding to the information. In other words, participants who report engaging in UAI and/or sharing needles were predicted to have lower ratings of problem importance and perceived personal risk than those who do not engage in these risky behaviors. In addition, highly threatened participants were expected to show more scientific scrutiny of the link between risk behaviors and the incidence of superinfection than those less threatened by the article.

To examine the relationship between participants' risk scores and defensive processing of threatening information, bivariate correlations between the risk score and the three new composite attitude and belief questions (i.e., problem importance, personal risk, and scientific scrutiny) were conducted. Participant superinfection risk scores were expected to evidence a negative correlation with problem importance and personal risk and a positive correlation with scientific scrutiny. Instead, analyses revealed insignificant, weak relationships between participant superinfection risk scores and the variables

problem importance ($r = -.12, p = .24$), personal perception of risk ($r = .08, p = .41$), and scientific scrutiny ($r = -.10, p = .31$).

In other words, correlational analyses did not reveal a pattern of defensive responding among high-risk individuals. Alternatively, regardless of risk level, participants generally indicated the risk of reinfection to PLH's health as very serious, and that changing risky sexual and drug-use behaviors to avoid reinfection is very important ($M = 11.12, SD = 1.80$). Participants also endorsed middling-to-high levels of confidence in the scientific legitimacy of the proposed link between risky health behaviors and the plausibility of experiencing superinfection ($M = 9.38, SD = 2.18$). Finally, despite level of reported risk, participants indicated themselves as having low risk of contracting a treatment-resistant virus through the process of reinfection ($M = 4.77, SD = 2.79$). This last finding is illustrative of defensive responding, as individuals who were highly at-risk for experiencing superinfection responded to the article by decreasing their ratings of personal risk. However, this is not the pattern of defensive processing that was anticipated; participants with no reported risk behaviors were expected to maintain their previous ratings.

After consulting the defensive bias literature, data were re-examined via four different statistical techniques (briefly described below) to further understand how participants processed the threatening health message according to level of risk. In particular, based on experiences described by Leffingwell and colleagues (2007), the following methods of analysis were employed in attempts of isolating patterns of responding in participants for whom the message was most relevant (i.e., seropositive MSM who engage in UAI with seropositive partners). First, the superinfection risk score

was collapsed into two variables, those with no reported risk (i.e., superinfection risk score = 0), and those who endorsed some level of risk (i.e., superinfection risk scores ranging from 125-1200). For demographic characteristics of at-risk participants, see Table 1. Independent samples *t*-tests were then conducted, specifically examining differences between no-risk and at-risk groups' response patterns to the three composite attitude and belief questions (i.e., problem importance, personal risk, and scientific scrutiny). Results were void of any significant effects; no differences were observed between no-risk and at-risk groups on variables of problem importance [$t(98) = 1.00, p = .32$], personal risk [$t(97) = -.05, p = .96$], or scientific scrutiny [$t(96) = 1.34, p = .18$].

Likewise, an independent *t*-test comparing responses between no-risk participants and the 23.8% of the sample identified as most at-risk for experiencing superinfection (i.e., participants who indicated engaging in unprotected sex with one or more seropositive partners) also did not indicate the presence of significant group differences. Thirdly, similar to methods described by Leffingwell and colleagues (2007), three new groups were created based on superinfection scores, including a no-risk group, a low-risk group consisting of participants with scores ranging within one standard deviation of the mean, and a high-risk group of participants with scores above one standard deviation (i.e., 26 participants). A one-way analysis of variance (ANOVA) comparing these three new groups on responses to post-article attitudes and beliefs scales also failed to yield significant effects for increasing message relevance and defensive responding ($p = .351$).

Finally, the propensity to engage in defensive processing of threatening health information was explored by comparing participants' self-assessments of risk over time. In particular, paired samples *t*-tests were conducted to evaluate the impact of the

threatening health message on participants' attitudes and beliefs about reinfection, specifically comparing initial responses on pre-experimental questions (i.e., the three pre-article attitudes and beliefs questions) to responses on the same three questions presented after the reinfection article. Although this method of analysis would not detect the presence of differences in post-article responding according to level of risk, a significant effect would indicate that the group as a whole changed their ratings after exposure to the threatening health message.

Results revealed significant differences between the pre- and post-experimental responses to questions regarding the seriousness of the threat of reinfection to HIV positive men's health [$t(98) = -4.56, p < .001$], the importance of decreasing risky behaviors to avoid experiencing the consequences associated with reinfection [$t(98) = -8.86, p < .001$], and perception of one's own risk of experiencing reinfection [$t(97) = 4.72, p < .001$]. Specifically, participants' ratings of the seriousness of the problem and importance of changing behaviors increased by an average of one point on the 6-point Likert-type scale (seriousness: $M = 5.62, SD = 1.02$; problem importance: $M = 5.48, SD = 1.05$). Additionally, participants' perceived risk ratings also differed significantly after exposure to the article ($M = 2.13, SD = 1.40$), with most participants assessing their own risk for experiencing reinfection as slightly lower than before. Thus, the current sample as a whole evidenced significant changes in their attitudes and beliefs about reinfection after being exposed to the article on reinfection, regardless of risk level. Results of paired sample t -tests are also presented in table 5.

Hypothesis 2. The second hypothesis was that individuals with high internal health locus of control (HLC) beliefs would be more likely to engage in defensive

processing than individuals with low internal HLC beliefs, due to the difference in perceived controllability of the disease. Additionally, it was hypothesized that individuals with high scores on the HLC chance scale would be less likely to engage in defensive processing than individuals with low chance HLC beliefs. In other words, at-risk participants with high internal HLC were predicted to deny the seriousness of reinfection, minimize perceived personal risk and show more scientific scrutiny regarding the link between risk behaviors and the incidence of superinfection than those who have low internal HLC beliefs. Conversely, at-risk participants with high scores on the chance HLC subscale were predicted to have higher ratings of problem importance and perceived personal risk and show less scientific scrutiny regarding the link between risk behaviors and reinfection than participants with lower scores on the chance HLC scale.

However, proposed analyses for hypothesis two were limited by the unexpected results of analyses for hypothesis one. Specifically, at-risk participants in the current study did not engage in the typical pattern of defensive processing as described in the defensive bias literature; rather, at-risk participants actually acknowledged the seriousness of reinfection and the importance of changing risky behaviors to avoid reinfection. On the other hand, at-risk participants did display a partially defensive reaction in responding to questions regarding one's own risk for experiencing reinfection. However, this effect was not captured by correlational analyses, as the whole sample generally gave similar ratings on personal risk perception questions regardless of their actual level of risk (i.e., according to superinfection risk score).

Alternatively, this effect was captured by analyses comparing personal risk perception ratings before presentation of the superinfection article to ratings on the same

questions after reading the article, with results indicating a significant decrease in risk perception ratings after exposure to the threatening health message for the sample *as a whole*, not just for those most at risk. Thus, since the typical defensive bias effect described in the literature was not observed in the current study (i.e., differences in no-risk and at-risk groups responses to dependent variables), the proposed analyses for hypothesis two were no longer applicable. Additionally, as described previously, histograms depicting the HLC subscales suggested a lack of variability in participant responses, further limiting the likelihood of identifying any differences in responding relative to HLC.

CHAPTER IV

DISCUSSION

Medical advancements occurring in the past decade in the treatment of HIV/AIDS have essentially transformed this disease into a life-long chronic illness. However, development of the phenomenon of superinfection poses a significant threat to the manageability of HIV by reducing the number of treatment options available and leading to faster progression to AIDS. Given the relatively recent documentation of this phenomenon, information related to the risks of superinfection may not have reached a proportion of the HIV population. One way to facilitate the spread of important health information to relevant parties is through secondary prevention efforts, with the medical setting as an important avenue for dissemination of new information. This can take the form of risk reduction counseling initiated by practitioners, or of written materials made available to patients, such as posters or pamphlets.

However, research has shown that when people receive personally relevant information such as a threatening health message, they often engage in defensive processing of the information by discounting the importance of the threat, minimizing their own perceptions of risk, attempting to interpret the information in a self-serving manner, or by attacking the credibility of the threatening information (Croyle & Sanda,

1988; Kunda, 1987; Liberman & Chaiken, 1992). This tendency, referred to as “defensive bias” in the literature (Kunda, 1987), may be motivated by a self-preservative quality. For instance, when presented with a threatening health message related to a negative consequence or condition that can be avoided by personal actions (e.g., using protection during sexual intercourse), defensive processing of that message will prevent thinking of oneself as irrational (for continuing to engage in UAI) or at-risk (for contracting a treatment-resistant strand of HIV). Unfortunately, questioning or doubting the threatening information further prevents adaptive changes in risky health behaviors. Thus, health messages may not have the intended effect of decreasing risky behaviors in populations targeted by the message.

The tendency to engage in defensive processing of threatening health information is an effect that has been replicated repeatedly in the literature across different settings (e.g., health clinic, college laboratory) with different paradigms, such as with the threat of a contrived disease (fibrocystic disease; Kunda, 1987), well-known disease or health condition (e.g., heart disease; Croyle, et al., 1993), and negative health outcome caused by engaging in risky behaviors (e.g., alcohol use; Leffingwell et al., 2007). The purpose of the present study was to investigate if presenting a threatening health messages regarding the risk of reinfection would elicit defensive processing in a sample of HIV-positive men recruited from the lobby of an internal medicine clinic. Furthermore, the study sought to determine if internal or external HLC would moderate processing of the threatening health message.

In the current study, the threat of reinfection was expected to create multiple outlets for participants to engage in defensive processing. Particularly, the idea of

reinfection challenges many MSM's perceptions regarding the safety of engaging in UAI with seroconcordant partners and the (incorrect) belief that protection during intercourse is unnecessary because "we both have HIV." Knowledge regarding reinfection also directly opposes the commonly held belief among PLH that having an 'undetectable viral load' equates to an inability to transmit HIV to partners. Thus, defensive processing was expected to be exhibited by participants with a high number of risky sexual and drug-use behaviors.

Results demonstrated that participants at-risk for experiencing reinfection engaged in a partially defensive pattern of processing. In particular, participants for whom the message was geared (i.e., MSM who have UAI or share needles during IV drug use with seropositive partners) reacted by agreeing with the article's claims regarding the seriousness of reinfection to HIV-positive men's health, and consequently rated the problem as even more serious. Similarly, after reading the article on reinfection, at-risk participants also increased their ratings regarding perceived importance of changing their own behaviors to reduce the risk of experiencing reinfection. Responses to these first two questions were not indicative of defensive processing of the threatening information. Conversely, on questions regarding perceived level of risk for experiencing reinfection, at-risk participants reacted by significantly minimizing their own perceptions of risk for experiencing reinfection. According to defensive bias theory, this pattern of defensive responding occurs because individuals are motivated to "save face" (e.g., by saying, "It won't happen to me.") when presented with a message showing that their own behaviors are the same behaviors posing serious threats to their health and/or have been shown to have long-term, potentially painful and fatal consequences. In contrast,

individuals for whom the message is irrelevant should not feel pulled to save face or process the message any further, and instead accurately estimate and report their own low levels of risk. However, this was not the case in the current study, as no-risk participants demonstrated the same response patterns as the at-risk participants. Specifically, no-risk participants also assigned higher ratings to questions about problem importance and seriousness of reinfection. Furthermore, similar to at-risk participants, no-risk participants were also observed to significantly decrease their estimates of personal risk after exposure to the threatening health message. According to defensive bias theory, participants who are not at risk for reinfection should not feel motivated to reduce their own risk estimates to avoid the consequences associated with reinfection. Findings of the current suggest a different pattern of processing is at play for these groups.

In sum, analyses and results of the current study were not consistent with typical results reported by most defensive bias studies (Kunda, 1987; Liberman and Chaiken, 1992). Furthermore, analyses used to detect the effect described above were dissimilar to those used in most defensive bias studies. In the literature, defensive responding has typically been defined as the presence of significant differences between no-risk and at-risk groups on estimates of personal risk after presentation of threatening health messages. Specifically, as predicted in the current study, past defensive bias studies have shown that individuals most at-risk for the negative effects of a disease tend to respond to threatening health messages by rating their personal risk for experiencing the consequences described in the message as significantly *lower* than ratings reported by no-risk individuals. Alternatively, in the current study, the defensive bias effect was not demonstrated with analyses comparing responses between no-risk and at-risk groups, as

these groups did not evidence any significant differences in their responses to attitudes and beliefs questions. Instead, the defensive bias effect was isolated by examining perceived risk estimates over time, using a comparison of participant personal ratings of risk prior to and immediately after exposure to the threatening health message.

Due to the unexpected results, data were reexamined using several other methods in attempts at isolating the defensive responding effect (see Leffingwell et al., 2007). However, these analyses did not detect the presence of other significant effects, even when the highest risk group was compared to no-risk and low-risk groups in processing of the threatening health message. Overall, high risk participants did not differ from no-risk participants in their high ratings of problem importance and seriousness of the threat of reinfection; a trend typically not observed in the past literature on defensive responding to threatening health messages.

Reasons for the homogeneity in group response patterns remain unclear. One explanation may be related to participant characteristics in the current study. Specifically, unlike many previous studies, participants were recruited from the lobby of an internal medicine HIV specialty clinic, which is part of a larger university-affiliated health sciences center and training program for medical residents. This specific clinic, similar to many others housed within university centers, is very active in training/supervision of medical students and participating in research related to HIV/AIDS. By virtue of participating in these activities, practitioners and students appear to stay more abreast of current research (i.e., compared to smaller and more private clinics) and incorporate advancements in knowledge regarding care and treatment. Furthermore, the clinic in the current study is well-known for providing comprehensive, high-standards of care, and

past performance surveys have yielded high ratings with regards to quality of care. Patient satisfaction with care was also observed during recruitment efforts. In particular, observations made by the research coordinator throughout the data collection process (e.g., viewing interactions between doctors and patients, overhearing discussions between patients within the waiting room area) indicated that overall, patients seemed generally happy with their providers, and that provider-patient relationships seemed comfortable and friendly. Perhaps previous exposure to information about the risks of reinfection occurred within this setting, and the generally positive attitudes patients demonstrated towards their practitioners allowed for better processing of information on reinfection, and higher degrees of trust in the accuracy of the information.

On the other hand, distracters present during the completion of these measures (i.e., interactions with multiple providers) may have precluded participants from fully attending to and processing information presented in the article. Furthermore, many participants were in a hurry to leave after the completion of their medical appointments, and observations made by the research coordinator revealed several participants to skim the article or skip the back page of reading together. Although these participants were prompted to reread skipped portions of the article, it is unknown whether other participants engaged in similar behaviors and thus did not receive the same level of exposure to the threatening health message.

Finally, the current study sought to determine if MHLC was related to processing of threatening health messages. Research has supported the idea that those who believe they have control over their health are more likely to take steps to promote health (as reviewed by Wallston & Wallston, et al., 1978). However, in the current study, proposed

analyses were not completed due to failure to establish a typical defensive bias effect, and also due to the lack of variability in participant responses to questions on the HLC scale. Specifically, participant responses to questions comprising the internal HLC scale indicated that most participants possessed high degrees of internal HLC. Other studies have showed similar range restriction and lack of variability with this scale (Bell et al., 2002; Carlson & Petti, 1989). Future attempts to examine this variable as a mediator of defensive processing will rely on a different method of measuring HLC.

Several limitations in the current study are acknowledged. First, the relatively small sample size prevented inferences related to demographic variables and information regarding involvement in risky behaviors. Future studies would benefit from larger samples. Another limitation was the length of the article on reinfection, and lack of opportunity to complete the measures in a quiet area without distractions. Participants may have been distracted by their interactions with providers during completion of measures, preventing full attention and deep processing of the information. Furthermore, observations made by the research coordinator revealed several participants to skim the article or skip portions of the reading all together, and it is unknown whether other participants engaged in similar shortcuts. However, this is just one disadvantage to conducting research in more natural versus contrived settings. Additional control of extraneous factors, such as time and exposure to article, can present equally disadvantageous trade-offs to studying the phenomenon of defensive bias in an environment where it naturally occurs. Finally, participant characteristics in the current study (i.e., higher education, better performance on HIV Knowledge Scale, more

participants with undetectable viral loads) prevents generalizability of results to the population of PLH as a whole.

Conclusions

In sum, the current study did not replicate previous studies' results pertaining to the tendency to engage in defensive processing in response to a threatening article. Contrary to what was expected, participants who were most threatened by the health message (i.e., those who engaged in UAI with seropositive partners) did not engage in defensive processing by minimizing the importance of the problem or the seriousness of the risks to MSM's health. However, at-risk participants did engage in partial defensive processing of the threatening health message by minimizing their perceived level of risk for experiencing reinfection after exposure to the threatening health message. Curiously, this trend was also observed in no-risk participants all well. Reasons for not finding the typical pattern of defensive processing may be related to characteristics of the current sample; specifically, the higher levels of education reported by participants in the sample and better performance on the HIV Knowledge Scale. Other explanations may be related history of exposure to information regarding reinfection within this particular medical setting and the general positive, trusting attitudes towards care providers in the clinic. Methodological issues, including the length of the article, lack of full participants attention to the article (i.e., due to clinic activities), and time constraints may also be a potential factor of the unexpected findings. Finally, the relationship between HLC and defensive bias was not explored in the current study (as initially planned) due to analyses revealing an atypical pattern of defensive responding exhibited by participants, in addition to the range restriction in participant responses on the internal HLC scale.

REFERENCES

- Adam, B. D., Husbands, W., Murray, J., & Maxwell, J. (2005). Risk construction in the reinfection discourses of HIV-positive men. *Health, Risk & Society, 7*, 63-71.
- Aronson, J., Cohen, G., Nail, P. R., Harmon-Jones, E., & Mills, J. (1999). Self-affirmation theory: An update and appraisal. In *Cognitive dissonance: Progress on a pivotal theory in social psychology*. (pp. 127-147): American Psychological Association.
- Bayer, R. (1996). AIDS prevention--Sexual ethics and responsibility. *New England Journal of Medicine, 334*, 1540-1542.
- Bell, R. A., Quandt, S. A., Arcury, T. A., McDonald, J., & Vitolins, M. Z. (2002). Health locus of control among rural older adults: Associations with demographic, health and preventive health characteristics. *Gerontology & Geriatrics Education, 22*, 69-89.
- Blalock, A.C., Campos, P.E. (2003). Human immunodeficiency virus and acquired immune deficiency syndrome. In L. Cohen, D. McChargue, & F. Collins (Eds.), *The Health Psychology Handbook* (pp. 383-395). California: Sage Publications, Inc.
- Bundek, N. I., Marks, G., & Richardson, J. L. (1993). Role of health locus of control beliefs in cancer screening of elderly Hispanic women. *Health Psychology, 12*, 193-199.
- Carlson, B. R., & Petti, K. (1989). Health locus of control and participation in physical activity. *American Journal of Health Promotion, 3*, 32-37.

Center for Disease Control. (1991). *Preventing Heart Disease and Stroke*. Retrieved June 29, 2005, from http://www.cdc.gov/nccdphp/bb_heartdisease/index.htm

Centers for Disease Control and Prevention. (1997). *Morbidity and mortality weekly report: Trends in AIDS incidence, deaths, and prevalence-United States*. Retrieved July 9, 2008 from <http://www.cdc.gov/mmwr/preview/mmwrhtml/00046531.htm>.

Centers for Disease Control and Prevention. (2001). *HIV strategic prevention plan: Extended through 2010*. Retrieved May 14, 2008 from <http://www.cdc.gov/hiv/resources/reports/psp/preface.htm>.

Centers for Disease Control and Prevention. (2003). *Morbidity and mortality weekly report: Incorporating HIV prevention into the medical care of persons living with HIV*. Retrieved July 9, 2008 from <http://www.cdc.gov/mmwr/preview/mmwrhtml/rr5212a1.htm>).

Centers for Disease Control and Prevention. (2006). *HIV/AIDS Surveillance Report: Cases of HIV Infection and AIDS in the United States and Dependent Areas, 2006*. Retrieved June 3, 2008 from <http://www.cdc.gov/hiv/topics/surveillance/basic.htm#hivest>.

Chiasson, M. A., Hirshfield, S., Remien, R. H., Humberstone, M., Wong, T., & Wolitski, R. J. (2007). A comparison of on-line and off-line sexual risk in men who have sex with men: An event-based on-line survey. *Journal of Acquired Immune Deficiency Syndromes*, 44, 235-243.

- Cohen, S. J., Halvorson, H. W., & Gosselink, C. A. (1994). Changing physician behavior to improve disease prevention. *Preventive Medicine: An International Journal Devoted to Practice and Theory*, 23, 284-291.
- Colfax, G.N., Guzman, R., Wheeler, S., Mansergh, G., Marks, G., Raders, M., et al. (2004). Beliefs about HIV reinfection (superinfection) and sexual behavior among a diverse sample of HIV-positive men who have sex with men. *Journal of Acquired Immune Deficiency Syndrome*, 36.
- Crepaz, N., Lyles, C. M., Wolitski, R. J., Passin, W. F., Rama, S. M., Herbst, J. H., et al. (2006). Do prevention interventions reduce HIV risk behaviours among people living with HIV? A meta-analytic review of controlled trials. *AIDS*, 20, 143-157.
- Croyle, R. T., Sun, Y.-c., & Louie, D. H. (1993). Psychological minimization of cholesterol test results: Moderators of appraisal in college students and community residents. *Health Psychology*, 12, 503-507.
- Davis, M. D. M., Hart, G., Imrie, J., Davidson, O., Williams, I., & Stephenson, J. (2002). 'HIV is HIV to me': The meanings of treatment, viral load and reinfection for gay men living with HIV. *Health, Risk & Society*, 4, 31-43.
- Ditto, P. H., Croyle, R. T., & Croyle, R. T. (1995). Understanding the impact of risk factor test results: Insights from a basic research program. In *Psychosocial effects of screening for disease prevention and detection*. (pp. 144-181): Oxford University Press.
- Ditto, P. H., Jemmott, J. B., & Darley, J. M. (1988). Appraising the threat of illness: A mental representational approach. *Health Psychology*, 7, 183-201.

- Ditto, P. H., & Lopez, D. F. (1992). Motivated skepticism: Use of differential decision criteria for preferred and nonpreferred conclusions. *Journal of Personality & Social Psychology, 63*, 568-584.
- Evans, S., Ferrando, S. J., Rabkin, J. G., & Fishman, B. (2000). Health locus of control, distress, and utilization of protease inhibitors among HIV-positive men. *Journal of Psychosomatic Research, 49*, 157-162.
- Fawzi, M. C. S., Jagannathan, P., Cabral, J., Banares, R., Salazar, J., Farmer, P., et al. (2006). Limitations in knowledge of HIV transmission among HIV-positive patients accessing case management services in a resource-poor setting. *AIDS Care, 18*, 764-771.
- Fisher, J. D., Willcutts, D. L. K., Misovich, S. J., & Weinstein, B. (1998). Dynamics of sexual risk behavior in HIV-infected men who have sex with men. *AIDS and Behavior, 2*, 101-113.
- Flateby, G., Eskild, A., Brekke, T., & Moi, H. (1996). Steady sexual relationship with an HIV-positive partner and the progression rate to AIDS. *AIDS, 10*, 1749-1751.
- Gerbert, B., Bronstone, A., Pantilat, S., McPhee, S., Allerton, M., & Moe, J. (1999). When asked, patients tell: Disclosure of sensitive health-risk behaviors. *Medical Care, 37*, 104-111.
- Gerbert, B., Maguire, B.T., & Coates, T.J. (1990). Are patients talking to their physicians about AIDS? *American Journal of Public Health, 80*, 467-469.
- Gerbert, B., Maguire, B. T., & Sumser, J. (1991). Public perception of risk of AIDS in health care settings. *AIDS Education and Prevention, 3*, 322-327.

- Halkitis, P. N., Green, K. A., Remien, R. H., Stirratt, M. J., Hoff, C. C., Wolitski, R. J., et al. (2005). Seroconcordant sexual partnerings of HIV-seropositive men who have sex with men. *AIDS, 19*, S77-S86.
- Halkitis, P. N., Parsons, J. T., & Wilton, L. (2003). Barebacking among gay and bisexual men in New York City: Explanations for the emergence of intentional unsafe behavior. *Archives of Sexual Behavior, 32*, 351-357.
- Halkitis, P. N., Wilton, L., Wolitski, R. J., Parsons, J. T., Hoff, C. C., & Bimbi, D. S. (2005). Barebacking identity among HIV-positive gay and bisexual men: Demographic, psychological, and behavioral correlates. *AIDS, 19*, S27-s35.
- Heckman, T. G., Kelly, J. A., & Somlai, A. M. (1998). Predictors of continued high-risk sexual behavior in a community sample of persons living with HIV/AIDS. *AIDS and Behavior, 2*, 127-135.
- Hill, D., Chapman, S., & Donovan, R. (1998). The return of scare tactics. *Tobacco Control, 7*, 5-8.
- Janssen, R. S., Holtgrave, D. R., Valdiserri, R. O., Shepherd, M., Gayle, H. D., & De Cock, K. M. (2001). The serostatus approach to fighting the HIV epidemic: Prevention strategies for infected individuals. *American Journal of Public Health, 91*, 1019-1024.
- Jemmott, J. B., Ditto, P. H., & Croyle, R. T. (1986). Judging health status: Effects of perceived prevalence and personal relevance. *Journal of Personality & Social Psychology, 50*, 899-905.
- Kaiser. (2005, February 14). *New York City health officials announce detection of*

rare drug-resistant HIV strain. Kaiser Daily Reports: The Comprehensive Source.

Retrieved http://kasiernetwork.org/daily_reports/rep_index.cfm?

hint1&DR_ID=28138.

- Kalichman, S. C. (2000). HIV transmission risk behaviors of men and women living with HIV-AIDS: Prevalence, predictors, and emerging clinical interventions. *Clinical Psychology: Science and Practice*, 7, 32-47.
- Kalichman, S. C., Kelly, J. A., & Rompa, D. (1997). Continued high-risk sex among HIV seropositive gay and bisexual men seeking HIV prevention services. *Health Psychology*, 16, 369-373.
- Kalichman, S. C., Roffman, R. A., Picciano, J. F., & Bolan, M. (1997). Sexual relationships, sexual behavior, and HIV infection: HIV-seropositive gay and bisexual men seeking prevention services. *Professional Psychology: Research and Practice*, 28, 355-360.
- Kelly, J. A., & Kalichman, S. C. (2002). Behavioral research in HIV/AIDS primary and secondary prevention: Recent advances and future directions. *Journal of Consulting and Clinical Psychology*, 70, 626-639.
- Kelly, J. A., St. Lawrence, J. S., Brasfield, T. L., & Lemke, A., Amidei, T., Roffman, R.E., Hood, H., Smith, J.E., Kilgore, H., McNeill, C. (1990). Psychological factors that predict AIDS high-risk versus AIDS precautionary behavior. *Journal of Consulting & Clinical Psychology*, 58, 117-120.
- Kelly, J. A., St. Lawrence, J. S., Hood, H. V., & Brasfield, T. L. (1989). An objective test of AIDS risk behavior knowledge: Scale development, validation, and norms. *Journal of Behavior Therapy and Experimental Psychiatry*, 20, 227-234.

- Kozal, M. J., Amico, K. R., Chiarella, J., Schreibman, T., Cornman, D., Fisher, W., et al. (2004). Antiretroviral resistance and high-risk transmission behavior among HIV-positive patients in clinical care. *AIDS, 18*, 2185-2189.
- Kruglanski, A. W. (1980). Lay epistemo-logic--process and contents: Another look at attribution theory. *Psychological Review, 87*, 70-87.
- Kruglanski, A. W., & Meinholdt, C. (1990). Cognitive and motivational bases of judgmental bias: Toward a synthesis. *Polish Psychological Bulletin, 21*, 291-305.
- Kunda, Z. (1987). Motivated inference: Self-serving generation and evaluation of causal theories. *Journal of Personality & Social Psychology, 53*, 636-647.
- Lee, C. (1989). Perceptions of immunity to disease in adult smokers. *Journal of Behavioral Medicine, 12*, 267-277.
- Leffingwell, T., Neumann, C., Babitzke, A., & Boczar, M. (2007). Defensively biased responding to risk information among alcohol-using college students. *Addictive Behaviors, 32*, 158-165.
- Little, S.J. (2000). Transmission and prevalence of HIV resistance among treatment-naïve subjects. *Antiviral Therapy, 5*, 33-40.
- Leventhal, H. (1970). Findings of theory in the study of fear communications. *Advances in experimental social psychology, 5*, 119-186.
- Liberman, A., & Chaiken, S. (1992). Defensive processing of personally relevant health messages. *Personality & Social Psychology Bulletin, 18*, 669-679.
- Lord, C. G., Ross, L., & Lepper, M. R. (1979). Biased assimilation and attitude polarization: The effects of prior theories on subsequently considered evidence. *Journal of Personality & Social Psychology, 37*, 2098-2109.

- Mansergh, G., Marks, G., Colfax, G. N., Guzman, R., Rader, M., & Buchbinder, S. (2002). 'Barebacking' in a diverse sample of men who have sex with men. *AIDS, 16*, 653-659.
- Marks, G., Burris, S., & Peterman, T. A. (1999). Reducing sexual transmission of HIV from those who know they are infected: The need for personal and collective responsibility. *AIDS, 13*, 297-306.
- Marks, G., Richardson, J. L., Crepaz, N., Stoyanoff, S., Milam, J., Kemper, C., et al. (2002). Are HIV care providers talking with patients about safer sex and disclosure?: A multi-clinic assessment. *AIDS, 16*, 1953-1957.
- McConnell, J., & Grant, R. (2003, February). *Sorting out serosorting with sexual network methods*. Paper presented at 10th Conference on Retroviruses and Opportunistic Infections, Boston, MA.
- Metsch, L.R., Pereyra, M., Rio C.D., Gardner, L., Duffus, W., Dickinson, G., et al. (2004). The delivery of HIV prevention counseling by physicians at HIV medical care settings in four U.S. cities. *American Journal of Public Health, 94*, 1186-1192.
- Molassiotis, A., Nahas-Lopez, V., Chung, W. Y. R., Lam, S. W. C., Li, C. K. P., & Lau, T. F. J. (2002). Factors associated with adherence to antiretroviral medication in HIV-infected patients. *International Journal of STD & AIDS, 13*, 301-310.
- Morton, M., Nelson, L., Walsh, C., Zimmerman, S., & Coe, R. M. (1996). Evaluation of a HIV/AIDS education program for adolescents. *Journal of Community Health: The Publication for Health Promotion and Disease Prevention, 21*, 23-35.

National Institute of Health. (2006). *HIV/AIDS prevention*. Retrieved June 2, 2008 from <http://www3.niaid.nih.gov/research/topics/HIV/prevention/intro/>.

Novak, R.M., Chen, L., MacArthur, R.D., Baxter, J.D., Hullsiek, K.H., Peng, G., et al. (2005). Prevalence of antiretroviral drug resistance mutations in chronically HIV-infected, treatment naïve patients: Implications for routine resistance screening before initiation of antiretroviral therapy. *Clinical Infectious Diseases*, 40, 468-474.

Norman, P., Bennett, P., Conner, M. (1996). Health locus of control. In *Predicting health behaviour: Research and practice with social cognition models*. (pp. 62-94): Open University Press.

Parker, M. M., Gordon, D., Reilly, A., Horowitz, H. W., Waters, M., Bennett, R., et al. (2007). Prevalence of drug-resistant and nonsubtype B HIV strains in antiretroviral-naïve, HIV-infected individuals in New York state. *AIDS Patient Care and STDs*, 21, 644-652.

Parsons, J. T., Severino, J. P., Grov, C., Bimbi, D. S., & Morgenstern, J. (2007). Internet use among gay and bisexual men with compulsive sexual behavior. *Sexual Addiction & Compulsivity*, 14, 239-256.

Preau, M., Vincent, E., Spire, B., Reliquet, V. r., Fournier, I., Michelet, C., et al. (2005). Health-related quality of life and health locus of control beliefs among HIV-infected treated patients. *Journal of Psychosomatic Research*, 59, 407-413.

Pyszczynski, T., Greenberg, J., & Holt, K. (1985). Maintaining consistency between self-serving beliefs and available data: A bias in information evaluation. *Personality & Social Psychology Bulletin*, 11, 179-190.

- Pyszcznski, T., & Greenberg, J. (1987). Toward an integration of cognitive and motivational perspectives on social inference: A biased hypothesis-testing model. In L. Berkowitz (Ed.), *Advances in experimental social psychology*, 20, 297-340. New York: Academic Press.
- Quadrel, M. J., & Lau, R. R. (1989). Health promotion, health locus of control, and health behavior: Two field experiments. *Journal of Applied Social Psychology*, 19, 1497-1521.
- Rhodes, T. J., Donoghoe, M. C., Hunter, G. M., & Stimson, G. V. (1993). Continued risk behaviour among HIV positive drug injectors in London: Implications for intervention. *Addiction*, 88, 1553-1560.
- Rio, C.D. (2003). New challenges in HIV care: Prevention among HIV-infected patients. *International AIDS Society*, 11, 140-144.
- Rotter, J. B. (1954). *Social learning and clinical psychology*: Prentice-Hall.
- Rotter, J. B. (1966). Generalized expectancies for internal versus external control of reinforcement. *Psychological Monographs: General & Applied*, 80, 1-28.
- Saewyc, E., Skay, C., Richens, K., Reis, E., Poon, C., & Murphy, A. (2006). Sexual orientation, sexual abuse, and HIV-risk behaviors among adolescents in the Pacific Northwest. *American Journal of Public Health*, 96, 1104-1110.
- Schiltz, M. A., & Sandfort, T. G. M. (2000). HIV-positive people, risk and sexual behaviour. *Social Science & Medicine*, 50, 1571-1588.
- Schreibman, T., & Friedland, G. (2003). Human immunodeficiency virus infection prevention: Strategies for clinicians. *HIV/AIDS*, 36, 1171-1176.

- Sherman, D. A. K., Nelson, L. D., & Steele, C. M. (2000). Do messages about health risks threaten the self? Increasing the acceptance of threatening health messages via self-affirmation. *Personality & Social Psychology Bulletin*, *26*, 1046-1058.
- Shope, J. T., Copeland, L. A., Maharg, R., & Dielman, T. E. (1993). Assessment of adolescent refusal skills in an Alcohol Misuse Prevention Study. *Health Education Quarterly*, *20*, 373-390.
- Slenker, S. E., Price, J. H., & O'Connell, J. K. (1985). Health locus of control of joggers and nonexercisers. *Perceptual & Motor Skills*, *61*, 323-328.
- Smith, D.M., Wong, J.K., Hightower, G.K. (2004, July). *The clinical consequences of HIV superinfection*. Paper presented at the XV International AIDS Conference, Bangkok, Thailand.
- Strickland, B. R. (1978). Internal-external expectancies and health-related behaviors. *Journal of Consulting & Clinical Psychology*, *46*, 1192-1211.
- Substance Abuse and Mental Health Services Administration [SAMHSA]. (2002). In Batki, S.L., & Selwyn, P.A. (Ed.), *Substance Abuse Treatment for Persons with HIV/AIDS*. Rockville, MD: Rockwall II.
- Sutton, S. (1992). Shock tactics and the myth of the inverted U. *British Journal of Addiction*, *87*, 517-519.
- Stuart, K., Borland, R., & McMurray, N. (1994). Self-efficacy, health locus of control, and smoking cessation. *Addictive Behaviors* *19*, 1-12.
- Ubbiali, A., Donati, D., Chiorri, C., Bregani, V., Cattaneo, E., Maffei, C., et al. (2008). The usefulness of the Multidimensional Health Locus of Control Form C (MHLC-C) for HIV + subjects: An Italian study. *AIDS Care*, *20*, 495-502.

- United States Census Bureau. (2011). *2010 poverty thresholds*. Retrieved November 15, 2011 from <http://www.census.gov/hhes/www/poverty/data/threshld/index.html>
- Wallston, B. S., & Wallston, K. A. (1978). Locus of control and health: A review of the literature. *Health Education Monographs*, *6*, 107-117.
- Williams-Piehot, P., Schneider, T. R., Pizarro, J., Mowad, L., & Salovey, P. (2004). Matching health messages to health locus of control beliefs for promoting mammography utilization. *Psychology & Health*, *19*, 407-423.
- Wolitski, R. J., Parsons, J. T., GÃ³mez, C. A., Purcell, D. W., Hoff, C. C., & Halkitis, P. N. (2005). Prevention with gay and bisexual men living with HIV: Rationale and methods of the Seropositive Urban Men's Intervention Trial (SUMIT). *AIDS*, *19*, S1-11.
- Wyer, R. S., & Frey, D. (1983). The effects of feedback about self and others on the recall and judgments of feedback-relevant information. *Journal of Experimental Social Psychology*, *19*, 540-559.

APPENDICES

APPENDIX A
TABLES

Table 1

Participant Characteristics

	Entire Sample (N=100)	At-risk participants (n = 65)
Sexual orientation		
Heterosexual	62 (62%)	16 (16.0%)
Homosexual	26 (26%)	42 (42.0%)
Bisexual	10 (10%)	4 (4.0%)
Ethnicity		
African-American	19 (19%)	13 (13.0%)
Caucasian	62 (62%)	40 (40.0%)
American Indian	12 (12%)	7 (7.0%)
Asian American	1 (1%)	1 (1.0%)
Hispanic/Latino	4 (4%)	2 (2.0%)
Other	2 (2%)	1 (1.0%)
History of:		
Mental illness	48 (42.6%)	29 (29.3%)
Sexual abuse	15 (15%)	9 (9.2%)
Commercial sex work	13 (13%)	9 (9.2%)

Note. Percentages of participant totals are listed in parentheses for sexual orientation, ethnicity, and incidence of mental illness, sexual abuse, and commercial sex work

Table 2

*Pattern and Structure Matrix for PRC with Oblim Rotation of Three Factor**Solution for Post-Experimental Beliefs Items*

Item	Components					
	(Eigenvalues in parentheses)					
	1		2		3	
	(1.62)		(1.46)		(1.06)	
Importance of decreasing risky behaviors to avoid reinfection	.879	.877	-.065	-.070	-.016	.106
Seriousness of the effects of engaging in risky behaviors HIV+ men's health	.851	.860	.074	.069	.068	.187
How at risk are you for developing reinfection within next 15 years	-.102	-.081	.855	.856	.186	.172
How much do you feel threatened by the information about reinfection	.107	.076	.845	.845	-.191	-.175
Rate the scientific merit of the study findings in the article	-.033	.082	.039	.039	.824	.819
Confidence that reinfection has been scientifically proven	.074	.162	-.037	-.037	.629	.639

Note. Items in bold in first column of each component were summed to create a composite score.

Component Score Matrix

Item	Component		
	1	2	3
Importance of reducing risk behaviors	.832	.046	-.236
Seriousness of risk behaviors	.815	-.096	-.316
Personal risk	.009	.862	.172
Personally threatened	.027	.837	-.232
Scientific merit	.360	.056	.735
Confidence in findings	.367	-.027	.529

Table 3

Independent T-tests for Differences between Mental Health, Sexual Abuse, and Commercial Sex Work Involvement on Superinfection Risk Scores

Variables from Fawzi et al., 2006		Superinfection risk score			t-value	p ≤
		n	mean	standard deviation		
History of mental illness	Yes	48	421.87	437.43	.57	.57
	No	51	374	381.08		
Previous sexual abuse	Yes	15	463.33	476.77	.71	.48
	No	83	381.93	397.16		
Past commercial sex work	Yes	13	452.60	125.53	1.36	.18
	No	83	374.40	402.01		

Table 4

Chi Square Analyses for Differences between Education, Sexual Orientation, Ethnicity, and Monthly Income on response to HIV knowledge scale

	HIV Knowledge		χ^2	$p \leq$
	High scorers	Low scorers		
Education level	(n = 78)		.58	.75
Below high school	7	4		
High school diploma	30	12		
Postsecondary	19	6		
Sexual orientation	(n = 88)		3.30	.19
Heterosexual	13	8		
Homosexual	43	14		
Bisexual	5	5		
Ethnicity	(n = 90)		6.24	.04*
Caucasian	42	12		
African American	9	10		
Non-white	11	6		
Monthly income	(n = 84)		2.96	.23
0 - \$500	21	8		
\$501- \$1000	23	7		
\$1001+	14	11		

Note: * Correlation is significant at the $p < .05$ level

Table 5

Paired T-test Analyses on Participant Ratings on Attitudes and Beliefs Questions Pre- and Post- Exposure to Threatening Health Message

Dependent Variables	Pre and post-article rankings on attitude and beliefs questions				
	Mean (standard deviation)		difference score	<i>t</i> -value	<i>p</i> ≤
	pre	post			
Problem Importance	3.41 (2.21)	5.48 (1.05)	-.65	-8.86	.000
Problem Seriousness	4.98 (1.41)	5.62 (1.02)	-2.07	-4.56	.000
Personal risk	2.90 (1.74)	2.13 (1.40)	.77	4.72	.000

APPENDIX B
MEASURES

Demographic Information

Gender:

Female _____
Male _____
Transgendered _____

Age (in years) _____

Ethnicity:

African American _____
Asian _____
Caucasian _____
Hispanic _____
Native American _____
Other _____

What was the last grade you completed in school? _____

Sexual Orientation:

Heterosexual _____
Homosexual _____
Bisexual _____

Which of the following best describes your current housing situation?

___ Permanent house or apartment
___ Temporary house or apartment
___ Residential program
___ Hospice/chronic hospital
___ Homeless
___ other (please explain: _____)

How long have you known your HIV+ status? _____

What was your most recent CD4 Count: _____

What was your most recent Viral Load: _____

Are you currently taking HIV antiviral medications? _____yes _____no

Which of the following best describes your monthly income before taxes?

___ 0-\$500
___ \$501-\$1000
___ \$1001-\$2000
___ \$2001-\$5000

- \$5000 or more
- unknown
- refuse to answer

Which of the following best describes your marital status?

- single
- partnered, living apart
- partnered, living together
- married
- separated
- divorced
- refuse to answer

Do you have a history of sexual abuse?

- yes
- no
- refuse to answer

Do you have a history of mental health problems (such as depression, anxiety, substance use, etc.)?

- yes
- no
- refuse to answer

Have you ever engaged in commercial sex work (i.e., either accepting payment for sex or giving payment for sex)?

- yes
- no
- refuse to answer

Screening Questionnaire
Sex-related behaviors

1. Have you had sex during the last 3 months? By sex we mean oral, vaginal, or anal intercourse.
 - Yes (continue with next item)
 - No (skip to item #7)
 - Refuse to answer

2. The next few items are about recent sexual behaviors. Answer the questions for each category.

In the last 3 months, have you had sex with a....	Male ___yes ___no	Female ___yes ___no	Transgendered ___yes ___no
Number of sexual partners	_____	_____	_____
Type of sexual activity (in each category, check all boxes that apply)	___oral ___anal	___oral ___vaginal ___anal	___oral ___vaginal ___anal
Were your sexual partners....	___HIV+ ___HIV - ___Unknown	___HIV+ ___HIV - ___Unknown	___HIV+ ___HIV - ___Unknown
How often did you use condoms during sexual intercourse?	___Always ___Sometimes ___Never	___Always ___Sometimes ___Never	___Always ___Sometimes ___Never

In the last 3 months, have you:

3. Had sex with partners who had STDs?
 yes
 no
 don't know
 refuse to answer

4. Had sex with a person who injects drugs, steroids, or vitamins?
 once a week or more
 two or three times a month
 about once a month
 once in the past 3 months
 never
 don't know
 refuse to answer

5. Had sex with others without disclosing your HIV+ status?
 once a week or more
 two or three times a month
 about once a month
 once in the past 3 months
 never
 don't know
 refuse to answer

6. Engaged in unprotected sex with an HIV+ partner?
 once a week or more
 two or three times a month

- about once a month
- once in the past 3 months
- never
- don't know
- refuse to answer

Drug-related behaviors

The next items are about your drug-related behaviors in the past 3 months.

In the past 3 months:

7. Have you injected non-prescription drugs (such as meth, speed, heroin, etc.) steroids, or vitamins with a needle?
 - yes (continue with next item)
 - no (skip this section)
 - refuse to answer

8. How often did you use brand new sterile needles and syringes?
 - always
 - sometimes
 - never
 - don't know
 - refuse to answer

9. How often did you use disinfected needles and syringes?
 - always
 - sometimes
 - never
 - don't know
 - refuse to answer

10. How often did you share needles, syringes, or other injection equipment?
 - always
 - sometimes
 - never
 - don't know
 - refuse to answer

11. If you shared needles, were the people that you shared needles, syringes, or other injection equipment with:
 - HIV+
 - HIV-
 - unknown
 - refuse to answer

HIV-related Knowledge

This questionnaire assesses HIV-related knowledge. Please indicate if the following statements are true or false.

1. Only homosexual ('gay') men can become infected with HIV.
 true
 false
2. Having more than one sexual partner without using protection will increase a person's chances of becoming infected with HIV.
 true
 false
3. Oral intercourse carries risk for AIDS virus transmission.
 true
 false
4. If someone is infected with HIV, uses injection drug and shares needles, he/she can spread HIV.
 true
 false
5. A person can get AIDS by sitting next to someone who is infected with HIV or by touching or hugging someone who is HIV infected.
 true
 false
6. The main body fluids that contain HIV are semen, blood, and vaginal secretions.
 true
 false
7. A person can get HIV from public toilets, drinking fountains, silverware, and telephones.
 true
 false
8. A blood test is what tells you if you are infected with HIV.
 true
 false
9. A person can protect him/herself from HIV infection by using a latex condom during sex.
 true
 false
10. If a person has HIV but doesn't know it, he/she can still give it to someone else.
 true
 false
11. You can always tell when a person is infected with HIV.
 true
 false
12. Pre-ejaculatory fluids carry the AIDS virus.
 true
 false

13. The AIDS virus does not penetrate unbroken skin.
___*true*
___*false*
14. If someone has a negative HIV blood test (meaning they do not have HIV), that means they cannot get HIV.
___*true*
___*false*
15. A person can be exposed to the AIDS virus in one sexual contact.
___*true*
___*false*
16. Keeping in good physical condition is the best way to prevent exposure to the HIV virus.
___*true*
___*false*
17. Showering after sex greatly reduces the transmission of AIDS.
___*true*
___*false*
18. It is safe for two people who have HIV to have unprotected sex or share needles, as long as they have no other STDs or viruses that can be transmitted.
___*true*
___*false*
19. Someone can have a negative HIV blood test and still have the virus.
___*true*
___*false*
20. Only receptive (passive) anal intercourse transmits AIDS.
___*true*
___*false*
21. Condoms make intercourse completely safe.
___*true*
___*false*
22. Most persons exposed to the AIDS virus know they are exposed.
___*true*
___*false*
23. Donating blood carries a risk of getting AIDS for the donor.
___*true*
___*false*
24. If a person who is HIV-positive has unprotected sex or shares needles with another person who is HIV-positive, transmission of drug-resistant viruses can occur (also known as superinfection or reinfection).
___*true*
___*false*
25. If two HIV-positive people have an “undetectable” viral load, it is safe to have unprotected sex or share needles.
___*true*
___*false*

HLC Form A Instructions: Each item below is a belief statement about your medical condition with which you may agree or disagree. Beside each statement is a scale which ranges from strongly disagree (1) to strongly agree (6). For each item we would like you to circle the number that represents the extent to which you agree or disagree with that statement. This is a measure of your personal beliefs; obviously, there are no right or wrong answers.

		SD	MD	D	A	MA	SA
	1=STRONGLY DISAGREE (SD)						
	2=MODERATELY DISAGREE (MD)						
	3=SLIGHTLY DISAGREE (D)						
	4=SLIGHTLY AGREE (A)						
	5=MODERATELY AGREE (MA)						
	6=STRONGLY AGREE (SA)						
1	If I get sick, it is my own behavior which determines how soon I get well again.	1	2	3	4	5	6
2	No matter what I do, if I am going to get sick, I will get sick.	1	2	3	4	5	6
3	Having regular contact with my physician is the best way for me to avoid illness.	1	2	3	4	5	6
4	Most things that affect my health happen to me by accident.	1	2	3	4	5	6
5	Whenever I don't feel well, I should consult a medically trained professional.	1	2	3	4	5	6
6	I am in control of my health.	1	2	3	4	5	6
7	My family has a lot to do with my becoming sick or staying healthy.	1	2	3	4	5	6
8	When I get sick, I am to blame.	1	2	3	4	5	6
9	Luck plays a big part in determining how soon I will recover from an illness.	1	2	3	4	5	6
10	Health professionals control my health.	1	2	3	4	5	6
11	My good health is largely a matter of good fortune.	1	2	3	4	5	6
12	The main thing which affects my health is what I myself do.	1	2	3	4	5	6
13	If I take care of myself, I can avoid illness.	1	2	3	4	5	6
14	Whenever I recover from an illness, it's usually because other people (for example, doctors, nurses, family, friends) have been taking good care of me.	1	2	3	4	5	6
15	No matter what I do, I'm likely to get sick.	1	2	3	4	5	6
16	If it's meant to be, I will stay healthy.	1	2	3	4	5	6
17	If I take the right actions, I can stay healthy.	1	2	3	4	5	6
18	Regarding my health, I can only do what my doctor tells me to do.						

Oklahoma State University Institutional Review Board

Date: Thursday, February 23, 2006
IRB Application No AS0666
Proposal Title: Defensive Bias and Health Locus of Control

Reviewed and Processed as: Expedited

Status Recommended by Reviewer(s): Approved Protocol Expires: 2/22/2007

Principal Investigator(s)

Melissa Jackson 215 North Murray Stillwater, OK 74078	Thad Leffingwell 215 N. Murray Stillwater, OK 74078
---	---

The IRB application referenced above has been approved. It is the judgment of the reviewers that the rights and welfare of individuals who may be asked to participate in this study will be respected, and that the research will be conducted in a manner consistent with the IRB requirements as outlined in section 45 CFR 46.

The final versions of any printed recruitment, consent and assent documents bearing the IRB approval stamp are attached to this letter. These are the versions that must be used during the study.

As Principal Investigator, it is your responsibility to do the following:

1. Conduct this study exactly as it has been approved. Any modifications to the research protocol must be submitted with the appropriate signatures for IRB approval.
2. Submit a request for continuation if the study extends beyond the approval period of one calendar year. This continuation must receive IRB review and approval before the research can continue.
3. Report any adverse events to the IRB Chair promptly. Adverse events are those which are unanticipated and impact the subjects during the course of this research; and
4. Notify the IRB office in writing when your research project is complete.

Please note that approved protocols are subject to monitoring by the IRB and that the IRB office has the authority to inspect research records associated with this protocol at any time. If you have questions about the IRB procedures or need any assistance from the Board, please contact Beth McTernan in 415 Whitehurst (phone: 405-744-5700, beth.mcternan@okstate.edu).

Sincerely,



Sue C. Jacobs, Chair
Institutional Review Board

*Original version of IRB, renewed until 2010

VITA

Melissa R. Jackson-Mignogna

Candidate for the Degree of

Doctor of Philosophy

Thesis: THE ROLE OF HEALTH LOCUS OF CONTROL ON DEFENSIVE
PROCESSING OF A THREATENING HIV HEALTH MESSAGE

Major Field: Psychology

Biographical:

Education:

Completed the requirements for the Doctor of Philosophy in Psychology at Oklahoma State University, Stillwater, Oklahoma in December, 2011.

Completed the requirements for the Master of Science in Psychology at Oklahoma State University, Stillwater, Oklahoma in May, 2007.

Completed the requirements for the Bachelor of Science in Psychology at University of Wyoming, Laramie, Wyoming in May, 2004.

Experience:

1. *Postdoctoral Fellow* at the Texas Children's Hospital Clinical Care Center under Baylor College of Medicine in Houston, TX
2. *Child Psychology Intern* at the University of Alabama Training Consortium, Birmingham, AL
3. *Practicum Student* at the OSU Internal Medicine Specialty Clinic, Tulsa, Oklahoma

Professional Memberships:

American Psychological Association Division 54, Pediatric Psychology

Name: Melissa R. Jackson-Mignogna

Date of Degree: December, 2011

Institution: Oklahoma State University

Location: Stillwater, Oklahoma

Title of Study: THE ROLE OF HEALTH LOCUS OF CONTROL ON DEFENSIVE
PROCESSING OF A THREATENING HIV HEALTH MESSAGE

Pages in Study: 101

Candidate for the Degree of Doctor of Philosophy

Major Field: Psychology

Scope and Method of Study: Research has continually shown that when individuals receive threatening health messages that contain personally relevant information, they show a greater tendency to be critical than if the message contained favorable information. The purpose of the study was to determine if presenting a threatening health message regarding the threat of experiencing superinfection (also known as reinfection) would lead to defensive processing in a sample of HIV positive men. Superinfection is a relatively new phenomenon documented among people living with HIV, referring to the ability to spread treatment-resistant mutations of HIV to sexual or intravenous drug-using partners. Inheriting a treatment-resistant form of HIV can result in limiting a person's options for antiretroviral treatment and potentially lead to a faster AIDS progression rate. Another purpose of this study was to determine if individuals' perceived control over changing behaviors which lead to negative health conditions, or health locus of control, affects the tendency to exhibiting defensive bias. Participants were recruited from the lobby of an internal medicine clinic and rewarded \$10 for participating. Each participant completed questions about sexual and drug-use risk behaviors and health locus of control. Next they were asked to read an article linking risky behaviors to the phenomenon of superinfection. Finally, participants answered questions capturing their beliefs and attitudes about the risk of superinfection, and estimated their own degree of risk for experiencing this phenomenon.

Findings and Conclusions: The presentation of a threatening health message was not shown to affect defensive processing. Participants did not engage in the typical pattern of defensive processing previously demonstrated in the literature. Instead, regardless of degree of risk, participants generally rated the phenomenon of superinfection as very important and serious to HIV positive men's health. Additionally, participants estimated their own risk as low. Since participants were not shown to exhibit defensive processing in this study, the second hypothesis regarding health locus of control could not be tested.

ADVISER'S APPROVAL: Dr. Thad R. Leffingwell
