AN ABSTRACT OF THE DISSERTATION OF

Jason W. Mitchell for the degree of Doctor of Philosophy in Public Health presented

on April 28, 2010.

Title: Examining the Role of Relationship Characteristics and Dynamics on Sexual

Risk Behavior among Gay Male Couples

Abstract approved:

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        Recent estimates indicate that over 50% of gay men acquire HIV from their

main sexual partners while in their relationship (Sullivan et al., 2009). Despite this

statistic, the majority of research has focused on individual factors as predictors of

unprotected anal intercourse (UAI) and not on relationship factors. The few studies

that have examined relationship factors indicate these dynamics are important for

better understanding HIV risk among gay male couples. The present study examined

how relationship factors of trust, relationship commitment, investment in sexual

agreements and other characteristics were associated with risky sexual behaviors

among gay male couples in Portland, Oregon and Seattle, Washington.

        A cross-sectional study design paired with a standard, reciprocal dyadic

collection method was used. Data were collected and analyzed from a convenience

sample of 142 gay male couples. Descriptive statistics, dyad-level logistic regression, and multilevel modeling to estimate actor-partner effects were used to examine the research hypotheses. Findings indicate that less than half of the couples had a sexual agreement and far fewer chose their agreement to be monogamous. In addition, couples who had a less positive attitude about using condoms with non-main partners and perceived more alternatives to their current sexual relationship were significantly more likely to be at higher risk for HIV. In contrast, couples who were employed were significantly less likely to be at higher risk for HIV. Only actor effects were detected to significantly predict HIV risk among the couples; no partner effects were significant.

Using themes that emerged from the study findings, important implications for public health are discussed. More specifically, data indicate a need for future HIV prevention strategies to focus on strengthening communication skills and improving relationship characteristics among gay male couples. Both strategies are needed in order to reduce HIV incidence among gay men and their main sexual partners. Areas of future research must emphasize the importance of collecting dyadic data and incorporating theories and measures that focus on relationship dynamics in order to further our understanding of HIV risk among gay male couples.

Examining the Role of Relationship Characteristics and Dynamics on Sexual Risk
Behavior among Gay Male Couples

by

Jason W. Mitchell

A DISSERTATION

submitted to

Oregon State University

in partial fulfillment of

the requirements for the

degree of

Doctor of Philosophy

Presented April 28, 2010

Commencement June 2010

Doctor of Philosophy dissertation of Jason W. Mitchell presented on April 28, 2010.

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I understand that my dissertation will become part of the permanent collection of Oregon State University libraries. My signature below authorizes release of my dissertation to any reader upon request.

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Jason W. Mitchell, Author

ACKNOWLEDGEMENTS

I wish to thank my committee members, Marie Harvey, Donna Champeau, Alan Acock, Becky Donatelle, and Jeff McCubbin, for providing continual encouragement, valuable direction and constructive feedback during the course of this study. I am particularly grateful to Alan Acock for guiding me through the analyses.

Marie Harvey has been a tremendous mentor and supporter of my research efforts. She has helped to enhance my skills for conducting exploratory dyadic research and has offered endless guidance along the course of the study. Her vision and belief on improving our understanding of how relationship characteristics and dynamics affect sexual risk behaviors among dyads has led to my own passion for this research. She has also been a great mentor with helping me with every step in designing my first study. Her support with guiding me along has been tremendous to my success in achieving my doctorate. I have the utmost respect for her as a researcher and mentor; I can only hope to strive to her level of expertise to conduct quality dyadic research and become a role model as a mentor.

Donna Champeau has been a key supporter in my doctoral program of study. She has played a crucial role in my decision to attend Oregon State University and has always encouraged me to pursue my research interests. She has always believed in my drive to help improve the health among gay, bisexual, and other men who have sex with men by conducting innovative, impactful research. The comfort that I received from Donna always gave me assurance on what was important for me to research and

pursue professionally. Her compassion and feedback have always helped me become a stronger individual; to persevere regardless of the setbacks that I may encounter during my journey of academia. She has also encouraged me to give back to and remain involved in the LGBT community. Her subtle and sometimes not-so-subtle support will always be appreciated and admired; I can only hope to become as compassionate and community-driven as what Donna has shown me.

Alan Acock provided valuable guidance and feedback on my survey instrument, data analyses, and study findings. Throughout my study, he always encouraged me to learn new analytical techniques, such as multilevel modeling, for indistinguishable dyads. His willingness to help me never went unnoticed and was always appreciated. He was a valuable asset to my learning and professional development that will never be forgotten.

Becky Donatelle, without a doubt, has strengthened my understanding of applying theory and writing to conduct innovative research. She was also a good mentor throughout my tenure at Oregon State University. Jeff McCubbin was quite helpful with organizing, orchestrating and ensuring that every step taken were in compliance with Graduate School rules and established processes during my doctoral program.

Many other individuals provided tremendous support throughout my doctoral program. Torsten Neilands, Peter Lachenbruch, Deborah Kashy, and Chris Agnew had each aided me with various aspects during my data analyses. A special thank you goes

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CHAPTER 1: INTRODUCTION

Gay, bisexual, and other men who have sex with men (MSM) continue to be

disproportionately affected by HIV/AIDS. According to the Centers for Disease

Control and Prevention (Centers for Disease Control and Prevention [CDC], 2007a;

2005; 2003), HIV diagnoses for MSM decreased during the 1980s and 1990s, but

current surveillance data has shown an increase in HIV diagnoses for this group.

Supporting this claim, CDC recently reported an increase of 8.6% in HIV/AIDS

diagnoses among MSM during 2001-2006 in 33 States that have confidential, name-

based HIV case reporting, whereas all other transmission categories reported decreases

(CDC, 2008a). For 2006, MSM accounted for 61% of all new HIV infections and 84%

of all new HIV infections among males (CDC, 2009), even though about 4% of males

in the U.S. identify themselves as MSM (CDC, 2007a).

Gay, bisexual, and other MSM populations in the United States are not alone in

their increase in new HIV infections. Other developed high-income countries, such as

Australia and those in Europe, have experienced similar trends of increased HIV

infection among MSM (Coates, 2008; Jaffe, Waldiseri, & De Cock, 2007). Men who

have sex with men in developed countries remain disproportionately affected by HIV

because risk factors and barriers to preventing the virus still exist.

The increase in HIV infections among MSM correlates with the observed

increases in unprotected anal intercourse (UAI), the primary risk factor for HIV

transmission in MSM (Coates, 2008). Gay men are at greater risk for contracting HIV because the virus is transmitted more efficiently through anal intercourse than by vaginal intercourse or oral sex (CDC, 2010; Curran, Jaffe, Hardy, Morgan, Selik, & Dondero, 1988; Sullivan & Wolitski, 2008; Varghese, Maher, Peterman, Branson, & Steketee, 2002). Of importance, Sullivan et al. (2009) have recently estimated that over 50% of gay men acquire HIV from their main sexual partners while in their relationship. Despite this statistic, the majority of research has focused on individual factors as predictors of UAI.

Previous empirical research suggests the increase in MSM practicing UAI may be attributed to the following individual factors: optimism about improved HIV treatment (Crepaz, Hart, & Marks, 2004; Halkitis, Zade, Shrem, & Marmor, 2004; Kelly, Hoffman, Rompa, & Gray, 1998; Koblin et al., 2003; Remien, Wagner, Carballo-Dieguez, 1998; Sullivan, Drake, & Sanchez, 2006; Vanable, Ostrow, McKirnan, Taywaditep, & Hope, 2000) complacency about sexual risk (CDC, 2009; Suarez & Miller, 2001); lack of knowledge of HIV serostatus (CDC, 2007a; 2009); substance use (CDC, 2007a; CDC, 2009; Mansergh et al., 2001; Ostrow & Stall, 2008; Stall et al., 2001); complex sexual decision making (CDC, 2007a; Wolitski, 2005); seeking sex partners on the Internet (Benotsch, Kalichman, & Cage, 2002; CDC, 2007a; Liau, Millet, & Marks, 2006); and failure to practice safer sex (CDC, 2007a; Wolitski, 2005). Other factors related to UAI among MSM include, social discrimination and cultural issues (CDC, 2007a; 2009); prior and current STD diagnoses (CDC, 2007a); and syndemic or the combined effect of risk factors (Stall et

al., 2003; Stall, Friendman, & Catania, 2008). Although empirical research has identified a number of factors contributing to the disproportionate rates of HIV infection among MSM, the sexual behavior of UAI poses a particular public health concern due to the increased risk it puts gay, bisexual, and other MSM for acquiring HIV (Wolitski, 2005).

Some MSM that have UAI select their sexual partners based on their own and partner's HIV status, either known or assumed. This selection process is known as serosorting (CDC, 2007a; 2009; Eaton, West, Kenny, & Kalichman, 2009) and is less effective than wearing condoms consistently and effectively. Serosorting fails to protect MSM from contracting HIV because some MSM remain unaware of their current HIV status while others purposefully refrain from disclosing their HIV status. Men who have sex with men who remain unaware of their HIV status were twice as likely to engage in UAI with two or more partners (Coates, 2008). Although it is unknown as to how many MSM are unaware of their HIV infection, it is estimated that approximately 25% of people in the U.S. who are infected with HIV are unaware of their infection (CDC, 2007a). In essence, MSM who practice UAI and are unaware of their HIV status or refrain from disclosing it, create the perfect mechanism for sustaining the disproportionate HIV rates among MSM.

Relationship Factors Associated with UAI

Beyond serosorting and other contributing factors, relational factors have been identified as possibilities for explaining why MSM practice UAI. The few studies that have examined relationship factors indicate these dynamics are important for better

understanding HIV risk among gay male couples. For example, gay men in various sexual relationships (LaSala, 2004a; 2004b) have embraced UAI as way to show their love, intimacy, and trust toward one another (Appleby, Miller, & Rothspan, 1999; Blais, 2006; Davidovich, de Wit, & Stroebe, 2004; de Vroome, Stroebe, Sandfort, de Wit, & Van Griensven, 2000; Fitzpatrick et al., 1994; McNeal, 1997; Worth, Reid, & McMillan, 2002). Relationship commitment and satisfaction has also been associated with gay male couples engaging in UAI (Davidovich, de Wit, & Stroebe, 2006; de Vroome et al., 2000). Furthermore, other relational factors have been identified as possible contributors to increased HIV risk among gay male couples, including: partner's sexual history (Boulton, McLean, Fitzpatrick, & Hart, 1995; McLean et al., 1994; Misovich, Fisher, & Coates, 1997), familiarity with the partner in general (Boulton et al., 1995; McNeal, 1997), monogamy (Misovich et al., 1997), gay community integration (Fergus, Lewis, Darbes, & Butterfield, 2005), relationship status or partner types (Appleby et al., 1999; Crawford et al., 2003; Davidovich, de Wit, & Stroebe, 2000; de Vroome et al., 2000; Fitzpatrick et al., 1994; LaSala, 2004a; 2004b; Prestage et al., 2006; Prestage et al., 2008), unknown or assumed partner's HIV status (Elford et al., 1999; Davidovich et al., 2000; 2004), and faulted sexual agreements (Davidovich et al., 2004; 2001; 2000; Elford, Bolding, Maguire, & Sherr, 1999; Hoff & Beougher, 2008; Hoff et al., 2009; Kippax et al., 2003; Xiridou, Geskus, de Wit, Coutinho, & Kretzschmar, 2003).

In summary, relationship factors provide additional reasons why gay male couples practice UAI. Recent estimates suggest that over half of gay men are

contracting HIV from their main sexual partner. As such, it is essential that research be conducted to better understand relationship factors that may contribute of the increase in UAI and subsequent HIV incidence among gay men and their main sexual partners. These studies that investigated relationship factors on sexual risk behaviors among gay male couples are, however, limited and have limitations.

Limitations of Previous Gay Couple Research Studies

A small body of literature has evolved to better understand why gay men are acquiring HIV from their main partners while in a steady relationship. This body of literature has significant limitations. Most theories that have been applied to understanding the determinants of safer sex behavior have focused heavily on individual-level constructs. Quantitative research that investigated gay couples has not always maintained the couple as the unit of analysis or investigated how individuals may independently influence their own and their partner's behavior simultaneously. The sexual behavior that puts gay men at risk for HIV is dyadic in nature. That is, it involves at least two people. The present study made note of these limitations to provide a better understanding for addressing this public health problem.

Most sexual behaviors occur in the context of two people and in this case, two gay men in a relationship. One limitation presented in many gay, bisexual, and other MSM HIV risk related research studies is the use of individual-level variables. These variables, derived from constructs found in theories and models used for explaining individual HIV risk behaviors, limit the scope of dyad research by discounting interpersonal characteristics and dynamics found among gay couples. Using an

individual-level social psychological model (i.e. Theories of Reasoned Action or Planned Behavior) emphasizes the individual as the unit of analysis, which is an inadequate method for measuring dyadic interdependent behavior (e.g. condom use) among gay couples (Agnew, 1999; Harmann & Amico, 2009; Hoff et al., 2009). Furthermore, more appropriate theories and models exist to help predict and explain interdependent behavior among gay couples, including the Theory of Interdependence (Kelley, Borawski, Flocke, & Keen, 2003; Kelley & Thibaut, 1978; Thibaut & Kelley, 1959) and Investment Model (Davidovich et al., 2006; Rusbult, 1980; Rusbult, Martz, & Agnew, 1998). Theoretical frameworks that focus on interpersonal factors and incorporate the dyad as unit of analysis are needed to address and measure relational characteristics and dynamics found among gay couples for better understanding UAI practices that relate to HIV risk.

Another limitation found in quantitative research among gay couples was collecting data from only one member of the sexual dyad. This methodology limits researchers ability to investigate how individuals may independently influence their partner's sexual behavior (Fergus et al., 2009), yet, previous studies investigating HIV risk among gay couples collected data from only one member of the sexual dyad (Crawford et al., 2003; Davidovich et al., 2001; Davidovich et al., 2000; 2004; 2006; de Vroome et al., 2000; Hoff, Coates, Barrett, Collette, & Ekstrand, 1996; Klausner, Pollack, Wong, & Katz, 2006; Moreau-Gruet, Jeannin, Dubois-Arber, & Spencer, 2001; Prestage et al., 2006; Prestage et al., 2008; Van de Ven et al., 2005). Other studies have collected data from both sexual partners (Appleby et al., 1999; Boesch et

al., 2007; Fergus et al., 2005; Fergus, Lewis, Darbes, & Kral, 2009; Hoff & Beougher, 2008; Hoff et al., 2009; Kurdek, 2007; LaSala, 2004a; 2004b; Lewis, Gladstone, Schmal, & Darbes, 2006; McNeal, 1997; Wagner et al., 2000; Worth et al., 2002). The importance of collecting and analyzing dyadic data is essential for better understanding and detecting if and how relationship dynamics and characteristics are associated with sexual risk behavior among gay couples. For instance, dyadic data would allow researchers to investigate how much gay men concur on their relationship types, sexual agreements, and relational factors. Dyadic data would also allow researchers to determine how much gay men influence their own and partner's sexual behavior simultaneously. Kenny (1996) refers to these influences as actor and partner effects. In detail, actor effects refer to the effect that one's own standing on a variable has on one's own sexual risk whereas partner effects refer to the effects that one's partner's standing on a variable has on one's own sexual risk (Kenny, 1996; Fergus et al., 2009).

Another limitation of many gay couple research studies was the analytical techniques used in correspondence to the level of data collection. When an individualistic approach for data collection was used for research with gay couples, it discounted the ability to measure and detect interdependent effects between partners let alone determining whether protective sexual behaviors or relationship dynamics had concurrency (Hoff & Beougher, 2008). Before 2006, previous analytical techniques were unavailable to researchers studying indistinguishable members like gay couples. Recent advances by Kenny, Kashy, and Cook (2006) have detailed a

series of analysis alternatives to measure and detect interdependence effects among gay couples by using multilevel modeling (Campbell & Kashy, 2002) for the Actor Partner Interdependence Model (APIM) (Kashy & Kenny, 2000). Multilevel modeling will also allow researchers to detect between and within differences and similarities among indistinguishable dyads (Kenny et al., 2006). Therefore, using multilevel modeling to estimate the APIM and for detecting differences and similarities among indistinguishable dyads is advantageous for better understanding how relationship characteristics and dynamics contribute to gay couple's risk for HIV. The present study addresses these limitations in order to strengthen the body of literature to better understand why gay men are acquiring HIV from their main sexual partners.

Significance of the Study

The trend of gay men acquiring HIV from their main partners within the context of a relationship is alarming (Blais, 2006; Davidovich et al., 2004; 2001; Kippax et al., 2003; Sullivan et al., 2009; Xiridou et al., 2003;). Previous qualitative and quantitative research on HIV risk among gay men has highlighted relationship characteristics of trust and desire for intimacy (Appleby et al., 1999; Blais, 2006; Davidovich et al., 2004; de Vroome et al., 2000; Fitzpatrick et al., 1994; McNeal, 1997; Worth et al., 2002) as well as relationship commitment (Davidovich et al., 2006; de Vroome et al., 2000) as the three primary relational factors given by gay men for why they engage in UAI with their primary partners. None of these studies investigated how all or some of these relational factors might collectively influence gay couples to engage in UAI.

In addition, relationship dynamics of communication have also contributed to HIV risk among gay couples. Communication about HIV status and sexual agreements play an important role in gay couples management of HIV risk (Davidovich et al., 2000; Hoff & Beougher, 2008; Hoff et al., 2009; Kippax et al., 2003; Lewis et al., 2006; Prestage et al., 2006). When relationship characteristics and dynamics of communication among gay couples combine, their risk for HIV increases when a combination of these events occur within the relationship: UAI is practiced, HIV status remains unknown or assumed, agreements are broken or remain unclear (Hoff et al., 2009; Hoff & Beougher, 2008; Davidovich et al., 2000; Worth et al., 2002; Prestage et al., 2006; Prestage et al., 2008).

The three primary relationship factors given by gay men for why they engage in UAI with their primary partners are the desire for intimacy, trust, and relationship commitment (Appleby et al., 1999; Blais, 2006; Davidovich et al., 2004; 2006; de Vroome et al., 2000; Fitzpatrick et al., 1994; McNeal, 1997; Worth et al., 2002). Also, the dynamics of communication about HIV status and sexual agreements have also contributed to an increase in UAI among gay men and their primary partners and therefore, their risk for HIV (Davidovich et al., 2000; Hoff & Beougher, 2008; Hoff et al., 2009; Kippax et al., 2003; Lewis et al., 2006; Prestage et al., 2006). Very few studies have examined how relationship dynamics of trust, relationship commitment, sexual agreements, and risk-related communications are associated with UAI among gay couples; more research is needed to better understand this public health issue.

In summary, the present study is significant because it utilized theories and models that incorporated interpersonal dynamics and characteristics to better understand HIV risk among gay couples. Additionally, data were collected from both members of the same-sex relationship for examining relationship characteristics and dynamics between and within the dyads. Dyadic data were also collected to investigate the interdependent effects of relationship characteristics and dynamics on HIV risk behaviors among gay couples by using multilevel modeling for the APIM.

Study Goal

The overall goal of this study was to increase understanding of how relationship characteristics of trust and commitment as well as relationship dynamics of sexual agreements were associated with sexual risk taking (UAI) and HIV risk among gay male couples.

Study Objectives and Hypotheses

In order to better understand how relationship characteristics and dynamics among gay couples were associated with HIV risk, four objectives with respective hypotheses were examined including:

Obj1. Evaluate the extent to which gay male couples made their agreements to be monogamous and the extent to which partners concurred that they had made and kept such an agreement.

Hyp1a. Gay male couples will make their sexual agreement to be monogamous.

Hyp1b. The majority of partners among gay male couples will concur and have kept their sexual agreement to be monogamous.

Obj2. Determine which dyad-level factors – including characteristics and relationship dynamics – are most strongly associated with high HIV risk and UAI with non-main partners.

Hyp2. Dyad-level characteristics and relationship dynamics will be associated with high HIV risk and having UAI with non-main partners.

Obj3. Determine which dyad-level factors – including characteristics and relationship dynamics – are most strongly associated with the sexual agreement to be monogamous.

Hyp3. Dyad-level characteristics and relationship dynamics will be associated with the sexual agreement to be monogamous.

Obj4. Assess whether an individual's reported trust level, relationship commitment, sexual agreement, HIV risk were influenced by his partner's reported trust level, relationship commitment, sexual agreement, and HIV risk.

Hyp4. Actor outcome measures will be positively associated with partner outcome measures.

The next chapter is a review of the literature specific to gay and other MSM on the epidemiology of HIV, theories and models used to predict or explain HIV-related sexual risk behavior, and individual and relationship risk factors associated with HIV infection. The subsequent chapter presents the research methods used for the study in order to address the objectives listed above. The results of the study are then presented. Finally, the results are discussed, implications for public health are addressed, and suggestions for future research are presented.

CHAPTER 2: LITERATURE REVIEW

The chapter begins with a discussion of an epidemiological overview of HIV/AIDS in gay, bisexual, and other men who have sex with men (MSM). The next section describes theories and models of HIV risk reduction in the same population. The fourth section describes dyad-level theories and models that may be used to explain and predict sexual risk behaviors among gay male couples. Risk factors associated with HIV infection among gay, bisexual, and other MSM are then described in the fifth section. The sixth section describes information on interpersonal factors related to HIV risk among gay male couples, including relationship characteristics and dynamics, and sexual agreements. The seventh section examines previous research methodologies with gay couples and discusses limitations. Finally, a summary is given with a brief description of the present study's rationale, overall goal, and objectives.

Epidemiology of HIV/AIDS in Gay, Bisexual, and other MSM

Before HAART

The reporting of U.S. AIDS cases among MSM began in 1985. During the 1980s, AIDS cases alone provided an adequate picture of HIV trends because the time between infection with HIV and progression to AIDS was predictable (CDC, 2006); only AIDS cases were reported. From 1985 through 1992, the reported AIDS cases steadily increased with the epidemic peaking in 1992 (CDC, 2008b). In particular, white (non-Hispanic) MSM had the highest number of AIDS cases, followed by Black (non-Hispanic), Hispanic, Asian/Pacific Islander, and American Indian/Alaska Native

MSM (CDC, 2008b). After 1992, the percentage of MSM with AIDS and new HIV diagnoses slightly decreased (CDC, 2008b). The overall decline in new HIV and AIDS cases and deaths among MSM was due in part to the success of highly active antiretroviral therapies (HAART), which became widely available during the mid-1990s (CDC, 2008b).

Post HAART

The wide availability of HAART in 1996 led to a dramatic decline in AIDS deaths among MSM and slowed the progression from HIV infection to AIDS (CDC, 2008c). According to the CDC (2006), whether HIV progresses to AIDS is dependent on the access, adherence, and response to HAART. As such, trends in AIDS cases alone no longer accurately reflect trends in HIV infection (CDC, 2006).

In the late 1990s, HIV/AIDS cases among MSM decreased with the advent of HAART. The decrease in HIV/AIDS cases was not, however, universal for all MSM and significantly differed by race/ethnicity. For instance, HIV/AIDS cases among white (non-Hispanic) MSM decreased while black (non-Hispanic), Hispanic, Asian/Pacific Islander, and American Indian/Alaska Native MSM HIV/AIDS cases all increased (CDC, 2008b). HIV/AIDS cases among ethnic minority MSM continued to increase into the early 2000s whereas HIV/AIDS cases among white MSM stabilized.

From 2001 though 2005, HIV/AIDS cases among MSM started to increase across all age groups and race/ethnicities. In general, the number of HIV/AIDS diagnoses among MSM increased 11% from 2001 through 2005 (CDC, 2007a). During this time frame, an estimated 19,620 MSM received a HIV/AIDS diagnoses as

reported from 33 states with long-term, confidential name-based HIV reporting systems (CDC, 2007a). Of those HIV/AIDS diagnoses, the majority MSM were between the ages of 25 and 44 years (CDC, 2008b). During this same time period, only HIV/AIDS cases among MSM between the ages of 13 and 24 years continued to annually increase (CDC, 2008b). In addition, all race/ethnicity HIV/AIDS cases among MSM increased between 2001 and 2005 with the highest prevalence occurring in White (non-Hispanic), followed by in descending order: Black (non-Hispanic), Hispanic, Asian/Pacific Islander, and American Indian/Alaska Native MSM (CDC, 2008b). In sum, HIV/AIDS cases among MSM decreased from 1992 through 2000 followed by an increase from 2001 through 2005.

Current

According to the Centers for Disease Control and Prevention, MSM account for nearly half of the more than one million people currently living with HIV (CDC, 2009). For each year in the U.S., MSM still account for more than half of all new HIV infections (CDC, 2009). Most current epidemiological data available describe estimates of new HIV infections among MSM for 2006. During this time period, MSM accounted for 61% of all new HIV infections and 84% of all new HIV infections among males (CDC, 2009), even though only about 4% males in the U.S. identify themselves as MSM (CDC, 2007a). As such, MSM are disproportionately affected by HIV/AIDS. Similar to previous epidemiological data during the early 2000s, new HIV/AIDS cases among MSM in 2006 also varied by age and race. For instance, most new infections among black and Hispanic MSM occurred among those

aged 13-29 while most new infections among white MSM occurred in their thirties and forties (CDC, 2009). Regardless of race, the majority of new HIV/AIDS cases among MSM had occurred in areas of residence greater or equal to 500,000 persons (CDC, 2008b). To summarize, HIV/AIDS cases continue to be disproportionate across all races among MSM populations with the majority of them residing in metropolitan areas.

Since the HIV epidemic began, HIV has disproportionately affected gay, bisexual, and other MSM. The greatest impact of the epidemic occurred before HAART was widely available. Once HAART began extending the lives of HIV-positive men, a shift occurred to more MSM living with HIV. Despite the lower HIV incidence among MSM in the 1990s, the disproportionate impact of HIV/AIDS among MSM continues today. In efforts to better understand why gay, bisexual, and other MSM continue to engage in high-risk sexual behaviors, past and current research has utilized several health behavior theories. The next section discusses the health behavior theories that have been applied to help explain why gay, bisexual, and other MSM continue to be disproportionately affected by HIV/AIDS.

Theories and Models of HIV Risk Reduction

Theories of HIV Risk Reduction

Health behavior theories are used in public health for either predicting or understanding a particular behavior. Since the advent of HIV, several theories of HIV risk reduction have dominated the field and been applied to either changing or explaining the association of HIV risk behavior among gay, bisexual, and other MSM.

The following discussion will briefly describe the main components of Health Belief Model, Theory of Reasoned Action, Social Cognitive Theory, and Transtheoretical Model, including how they have been used for predicting or changing HIV risk behaviors in MSM.

The Health Belief Model (HBM) contains four main components: (1) individual differences that influence behavior; (2) perceived susceptibility and perceived severity of a health threat; (3) values or expectancies for taking action, including perceived benefits, barrier effectiveness, and costs for action; and (4) cues in the environment that promote action (Kalichman, 1998). In general, the premise of this model suggests alterations in a person's belief system will result in the person making behavioral changes. Applied to a HIV risk reduction approach, components of the HBM would be applied to describe an individuals: (1) perceived vulnerability to AIDS; (2) beliefs about the severity of AIDS; (3) perceptions of risk-reducing actions; and (4) environmental cues such as knowing someone who is HIV-positive or has AIDS. Thus, each of the constructs may be altered to reflect the appropriate individual beliefs and perceptions of a specific health behavior. Furthermore, previous HIV prevention research has generally used and treated HBM constructs as separate entities with perceived susceptibility as the most likely construct of predicting AIDS-protective behaviors among MSM (Rosenstock, Strecher, & Becker, 1994). HIV risk behavior studies among MSM have, however, failed to incorporate all HBM constructs, thereby dismissing a possible additive or synergistic effect among the constructs in predicting or changing sexual health behaviors among MSM (Rosenstock

et al., 1994). Nonetheless, the HBM emphasizes how a person's belief system influences behavior change.

In contrast, the Theory of Reasoned Action (TRA) suggests a person's intentions, attitudes and perceived norms, predict behavior. More specifically, the theory posits that a person's behavioral intentions are determined by his perceptions, attitudes, beliefs, and social norms on the behavior (Kalichman, 1998). For example, Cochran, Mays, Ciarletta, Caruso, and Mallon (1992) tested the efficacy of TRA in predicting AIDS-related sexual risk reduction in gay men and found empirical support for TRA as an attitude-behavior model of HIV sexual risk reduction in gay men. Specifically, the study suggested attitudes toward safer sex and beliefs that important referents expected the individual to practice safer sex successfully predicted his intention to do so (Cochran et al., 1992). Unlike HBM, TRA focuses on the influential factors of intention to predict behavior.

Social Cognitive Theory (SCT) combines aspects of HBM and TRA yet differs by describing a functional dependence between behavior, the external environment, and intrapersonal factors that include cognitive, affective, and biological processes (Kalichman, 1998). Unlike HBM and TRA, SCT posits that behavior change is a direct result from observing and interpreting an individual's behavioral performances. The observation and interpretation of behavior is what ties an individual's capability and confidence to the performance of a behavior and is known as self-efficacy. According to Bandura (1997), self-efficacy is an individual's capability to organize and execute courses of action required to produce given attainments. Thus, self-

efficacy distinguishes SCT from HBM and TRA by focusing on an individual's capability and confidence to perform a specific health behavior under specified conditions instead of on his or her intention or beliefs.

The Transtheoretical Model (TM) by Prochaska, DiClemente, & Norcross (1992) is unlike SCT and HBM because it places individuals in various stages according to their awareness, intention, and action of the specified behavior. These various stages refer to the stages of change, consisting of precontemplation, contemplation, preparation, action, and maintenance (Kalichman, 1998). The model allows researchers and practitioners to place individuals in the stage that best describe where they are for change on that particular behavior. The focus on intention is similar to that found in TRA. Other underlying constructs of self-efficacy, attitudes, beliefs, and perceived perceptions found in SCT and HBM are also apart of TM. In all, TM is a staged model containing constructs found in other theories and models that classifies an individual according to his or her "readiness" and "practice" for a particular behavior.

Specific Models of HIV Risk Reduction

The aforementioned theories and model provided basic information for highlighting which particular constructs are used for either predicting or changing a specified behavior. However, these generalized psychological theories of behavior change fail to address the complexities of sexual behavior. As such, AIDS Risk Reduction Model and Information-Motivation-Behavioral Skills Model were

developed to address this need by using the same constructs found in HBM, TRA,

SCT, TM, among others. These models are described below.

Catania, Kegeles, and Coates (1990) specifically addressed the complexities of

sexual behavior by developing the AIDS Risk Reduction Model (ARRM). Similar to

TM, ARRM is also a stage model where an individual progresses through processes of

behavior change (Kalichman, 1998). The model has an individual progress through the

various stages by 1) labeling his vulnerability to HIV infection; 2) committing to

altering his condom attitudes and improving self-efficacy; and 3) seeking help for

changing his sexual HIV risk behaviors through communication and initiating condom

use. In sum, ARRM is a framework outlining the necessary constructs needed for an

individual to reduce his risk for HIV.

Similar to ARRM, Information-Motivation-Behavioral (IMB) Skills model

was also designed to address the complexities of sexual behavior for reducing HIV

infection. IMB has three main components that pertain to AIDS risk reduction –

information, motivation, and behavioral skills (Fisher & Fisher, 1992). Each

individual component in IMB has the potential to produce AIDS preventive behavior.

However, several other pathways are illustrated to indicate how these components

may interact to produce risk-reduction behavioral outcomes. For example, an

individual's information and motivation may directly affect one another and as such,

creating a synergistic effect on influencing behavioral skills. The overall framework of

IMB states that information and motivation activate behavioral skills to ultimately

enact risk reduction behaviors, where behavioral skills directly influence AIDS risk-

reduction behavior in an individual (Kalichman, 1998). In summary, IMB provides another useful, testable framework using constructs from the most generalized theories of behavior change.

Constructs Used to Predict Sexual Behavior

Constructs from the aforementioned health behavior theories have been previously tested to predict sexual risk behavior among gay, bisexual, and other MSM. For example, one of the two most common studied theoretical constructs for sexual behavior is intention (de Vroome et al., 2000). Empirical support from previous studies predicting HIV-preventive behavior in gay men (e.g. condom use) has indicated behavior is primarily a function of an individual's intention to perform that behavior (de Wit, Stoebe, de Vroome, Sandfort, & van Grinsven, 2000; de Vroome et al., 2000; Fisher, Fisher, & Rye, 1995; Kasprzyk, Montano, & Fishbein, 1998; White, Terry, & Hogg, 1994) as influenced by his attitudes toward performing the behavior and by subjective norms (de Vroome et al., 2000). More specifically, research on HIV risk among gay men has consistently demonstrated intentions to use condoms are determined by the individual's attitudes toward using condoms and by subjective norms (de Wit et al., 2000; Fisher et al., 1995; Kasprzyk et al., 1998; de Vroome, 2000).

The other commonly studied theoretical construct for sexual behavior among gay, bisexual, and other MSM research is perceived behavioral control from the Theory of Planned Behavior (Ajzen, 1991), an extension of the Theory of Reasoned Action (Fishbein & Ajzen, 1975; de Vroome et al., 2000). In particular, perceived

behavioral control is an important theoretical construct of sexual risk behavior used to predict intentions and sexual risk, including extradyadic sex (de Vroome et al., 2000) and condom use (Kasprzyk et al., 1998) among gay men.

Although behavioral intentions and perceived behavioral control have been empirically tested to predict sexual risk behavior among gay, bisexual, and other MSM, other constructs have been identified for predicting and understanding HIV risk behavior as well. For example, notes taken from the NIH Consensus Development Conference on Interventions to Prevent HIV Risk Behaviors detailed several variables theorists agreed were central to predicting and understanding HIV risk behaviors. Besides behavioral intentions, other variables that were identified, included: skills and abilities necessary for behavioral performance; presence or absence of environmental constraints that could prevent behavioral performance; attitude toward performing the behavior based on positive or negative outcome expectancies; perceived norms concerning behavioral performance; self-standards with respect to performing the behavior; emotional reactions related to and as a result of the behavior; and self-efficacy with respect to behavioral performance (Fishbein, 1997).

Summary

The three theories that have had the greatest impact on AIDS intervention research, HBM, SCT and TRA, represent a public health, clinical, and a social-psychological approach to understanding behavior and behavior change (Fishbein, 1997). Risk reduction models of TM, ARRM and IBM, built on these theories approached the influences on sexual risk behavior differently, yet used similar

constructs from HBM, SCT and TRA. Furthermore, previous studies indicated the constructs of behavioral intention and perceived behavioral control were the best predictors for either condom use or extradyadic sex among gay, bisexual, and other MSM.

Although theorists have agreed that intentions and skills were probably necessary and sufficient for predicting sexual risk behavior (Fishbein, 1997), the individual-level constructs are intrapersonal and fail to account for the affect of interpersonal factors on sexual risk behavior among sexual dyads. Moreover, CDC's best evidence interventions targeting MSM, also discount the influence of interpersonal factors on HIV risk for reducing high-risk sexual behavior between serodiscordant, non-primary partners, and those of unknown HIV serostatus (CDC, 2007b).

Dyad-Level Theories and Models

Justification

In support for including interpersonal factors for predicting sexual risk behavior, current research indicates that gay men are acquiring HIV from their primary sexual partner more so than from non-primary sexual partners (Davidovich et al., 2001; Davidovich et al., 2004; Xiridou et al., 2003). As such, interpersonal attributes including relationship factors, characteristics, and dynamics must be included when predicting sexual risk behavior for HIV among gay male couples.

Psychosocial health theories, HIV risk reduction models, and individualistic determinants described above are limited in the same respect as the CDC's best

evidence HIV interventions for MSM. All focus on the individual and discount the interactions and influences occurring within a couple. For example, condom use is an interdependent behavior because it requires both members of the dyad to participate. Therefore, using the interpersonal approach is necessary for better understanding how relationship dynamics and characteristics among gay couples influence their sexual behaviors. Other more appropriate theories and models exist and must be applied to help predict and explain interdependent behaviors among gay couples, including the Theory of Interdependence (Kelley et al., 2003; Kelley & Thibaut, 1978; Thibaut & Kelley, 1959) and the related Investment Model (Davidovich et al., 2006; Rusbult, 1980; Rusbult et al., 1998). The following paragraphs describe the Theory of Interdependence and Investment Model.

Theory of Interdependence and Investment Model

The Theory of Interdependence suggests the behaviors among dyads are interdependent because each member controls and influences the outcomes in their interactions (Kelley & Thibaut, 1978). The outcomes depend on each member's option, value and assessment of the behaviors important to the relationship. The nature and lifespan of the interdependent relationship is based on the constant evaluation of outcome rewards and costs gained from the lifespan of these behavioral interactions (Kelley & Thibaut, 1978). Therefore, behavioral interactions among interpersonal dyads are interdependent in nature because the participation or cooperation from each dyad member is required.

The Investment Model examines the processes in which people persist within interpersonal relationships (Le & Agnew, 2003; Rusbult, 1980). The model is comprised of four constructs, including level of relationship satisfaction, quality of alternatives to the relationship, investment size within the relationship, and relationship commitment level. Commitment in interpersonal sexual relationships is characterized by having a long-term orientation toward the partnership, an intention to remain in a relationship, and a psychological attachment to a partner (Arriaga & Agnew, 2001; Le & Agnew, 2003; Rusbult & Buunk, 1993). In addition, satisfaction level refers to the comparison of negative and positive outcomes that one experiences in a relationship. Quality of alternatives refers to the perception that an attractive alternative relational prospect exists outside of the current relationship and that it will provide superior outcomes when compared to the current relationship (Le & Agnew, 2003). Investment size consists of concrete or tangible resources in the relationship that would be lost or greatly reduced if the relationship would end (Le & Agnew, 2003). The compilation of satisfaction level, quality of alternatives, and investment size constructs indicates the level of commitment existing within interpersonal relationships and in turn, the probability of the relationship persisting (Rusbult et al., 1998).

Summary

The Theory of Interdependence and Investment Model provide a theoretical framework that supports behavioral interactions and relationship investment among interpersonal sexual relationships that are not independent in nature. In fact, sexual

risk behavior among gay couples is interdependent and may be influenced by the level of satisfaction, quality of alternatives, investment size, and commitment level to the relationship. Few studies have examined how commitment and other Investment Model constructs are associated with sexual risk behavior among gay couples. Of those studies, research has either focused on how the Investment model constructs were associated with predicting risky sex among gay men and their steady partners (Davidovich et al., 2006) or among gay couples and their causal sex partners (de Vroome et al., 2000). More research is needed to examine how relationship characteristics within the Investment model are associated with sexual risk behavior among gay men with steady sexual partners (gay couples) and among gay men with steady and causal sex partners.

Theories and models that focus on interpersonal interactions and influences are needed to advance research on gay couples to better understand which relationship factors influence gay men to engage in sexual risk behaviors (e.g. UAI) with their primary or secondary partners. Ultimately, data obtained from research that incorporates relationship factors and dynamics will be paramount in developing more appropriate HIV prevention interventions targeting gay male couples.

Individual HIV Risk Factors among Gay, Bisexual, and other MSM

This section describes individual risk factors associated with HIV infection among gay, bisexual, and other MSM. The discussion includes the primary sexual risk behavior associated with HIV acquisition among this population as well as other individual HIV risk factors previous research has identified. Finally, a summary

concludes by identifying how solely studying individualistic HIV risk factors limits the understanding of HIV risk among gay male couples.

Gay, bisexual, and other MSM have remained disproportionately affected by HIV/AIDS since the early 1980s. Although HIV prevalence and incidence have fluctuated over the past two and half decades, the recent trend of increased HIV infections among MSM indicates there's an increase in the primary sexual risk behavior for HIV transmission in gay, bisexual, and other MSM - unprotected anal intercourse (UAI) (Coates, 2008). Unlike their heterosexual counterparts, gay, bisexual, and other MSM are at greater risk for contracting HIV because the virus is transmitted more efficiently through anal intercourse than vaginal intercourse or oral sex (CDC, 2010; Curran, Jaffe, Hardy, Morgan, Selik, & Dondero, 1988; Sullivan & Wolitski, 2008; Varghese, Maher, Peterman, Branson, & Steketee, 2002). Previous empirical research has identified a variety of factors contributing to an increase in UAI among gay, bisexual, and other MSM. For example, optimism about HIV treatments (Crepaz, Hart, & Marks, 2004; Halkitis et al., 2004; Kelly et al., 1998; Koblin et al., 2003; Remien, Wagner, Carballo-Dieguez, & Dolezal, 1998; Sullivan et al., 2006; Vanable et al., 2000), complacency about sexual risk (CDC, 2009; Suarez & Miller, 2001), and lack of knowledge of HIV serostatus (CDC, 2007a; 2009) have been positively associated with UAI and in turn, HIV risk for this population. Further, social discrimination and cultural issues (CDC, 2007a; 2009), including barebacking culture and seeking sex partners on the Internet (Benotsch, et al., 2002; CDC, 2007a; Liau, et al., 2006) has also been correlated with UAI among these men. In addition,

complex sexual decision making (CDC, 2007a; Wolitski, 2005), serosorting (CDC, 2007a; 2009; Eaton et al., 2009), and substance use (CDC, 2007a; 2009; Mansergh et al., 2001; Ostrow & Stall, 2008; Stall et al., 2001), have been correlated with UAI among gay, bisexual, and other MSM.

The individual risk factors described above provide a limited scope on why gay, bisexual, and other MSM are engaging in UAI and in turn, increasing their risk for contracting HIV. Because most sexual behaviors occur between two individuals and within the interpersonal context of sexual relationships, more research is needed to explore if and how relational factors are associated with sexual risk behavior among gay men. The next section will describe what relationship factors, dynamics, and characteristics previous research has identified as potential UAI risk factors among gay male couples.

HIV Risk and Interpersonal Factors among Gay Male Couples

Relationship Characteristics and Dynamics

Previous research has shown that gay men in seroconcordant relationships are more likely to have unprotected anal intercourse with each other than their single counterparts are with casual partners (Hoff & Beougher, 2008; Hoff et al., 1996; Hoff et al., 1997; Stall et al., 2000). Hypothetically, HIV negative gay men in these relationships may pose little risk for acquiring HIV, particularly when both partners have previously been tested, shared their HIV status with each other, and have not had any unprotected extradyadic sex. Not all men are, however, aware of their partners HIV status or only have had unprotected sex with their main partner (CDC, 2005;

2007a; Wolitski, 2005). As such, recent studies have indicated that high numbers of gay men acquire HIV from their main partners while in their relationship (Davidovich et al., 2000; 2004; Davidovich et al., 2001; Hoff & Beougher, 2008; Kippax et al., 2003; Sullivan et al., 2009; Xiridou, et al., 2003).

Because gay men are acquiring HIV from their main partners, it is important to understand what relational factors contribute to their HIV risk behavior. First, it is important to define what is meant by relational factors. Relational factors include both relationship characteristics and dynamics. Relationship characteristics describe the qualities of a specific relationship while relationship dynamics describe the interactions that impact both members of the sexual dyad. Previous research with gay couples has identified several relationship characteristics and dynamics that influence condom use. Many gay men have identified the desire for intimacy (Adam, Husbands, Murray, & Maxwell, 2005; Blais, 2006; Crawford et al., 2003; McNeal, 1997), wanting to instill and maintain trust (Adam, Sears, & Schellenberg, 2000; Adam et al., 2005; Appleby et al., 1999; Blais, 2006; Crawford et al., 2003; Davidovich et al., 2004; Kippax et al., 2003; Prestage et al., 2006; Worth et al., 2002), increase relationship satisfaction (McNeal, 1997), and relationship commitment (Davidovich et al., 2006) as reasons for not using condoms with their main partners. In addition, relationship types among gay men have also been identified as potential contributors to increasing their risk for HIV. For example, some gay male couples may be exclusive with sexual activities occurring only with each other whereas other gay male couples may have more of an 'open' relationship and participate in sexual activities

with other partners. Often, the label of the relationship type matches the sexual activities, but exceptions to this generalization exist. As such, navigating sexual activities and HIV risk in the gay community can be difficult when varying degrees of sexual relationships exist among gay, bisexual, and other MSM that depend on the dynamics that exist in these sexual relationships. Appropriately, it is important to discuss which relationship dynamics have been previously examined as possible contributors to HIV risk among gay couples.

Sexual Agreements

Although relational characteristics may help explain why some gay men have UAI, the relationship dynamics of communication, sexual agreements, and parity are also important to examine. Gay male couples have created sexual agreements to reduce HIV risk as well as strengthen their relationships. Interestingly, most sexual agreements typically relate to the relationship type among gay couples (Hoff & Beougher, 2008; LaSala, 2004a; 2004b). One form of sexual agreement created and used by HIV negative seroconcordant gay male couples has been coined 'negotiated safety' by Kippax et al. (1993, 1997). The sexual agreement of 'negotiated safety' has two primary components for reducing HIV risk among gay male couples: knowing and having the same HIV status of their main partner and agreeing to always use condoms for anal intercourse with outside partners (Hoff & Beougher, 2008; Kippax et al., 1993; Kippax et al., 1997). If either component is broken, then the gay male couple must go back to using condoms with each other until they have passed the window period for possible HIV infection.

Hypothetically, sexual agreements among gay male couples would greatly reduce their HIV risk if those two primary components were followed consistently. However, agreements have been broken and gay men are infecting their main relationship partners (Davidovich et al., 2000; 2006; de Vroome et al., 2000; Hoff & Beougher, 2008; Prestage et al., 2006), either because they fail to disclose the breach in agreement or report it after they have already exposed their main partner to HIV. Consequently, broken sexual agreements have been associated with difficulties of using condoms for anal intercourse with outside partners among gay men in relationships (Elford et al., 1999; Hoff & Beougher, 2008).

Furthermore, the Sexual Agreement Investment Scale (SAIS) was recently developed to address the complexity of sexual agreements among gay male couples. The measurement examines the attitudes gay men have about their sexual agreements and contains three subscales that ask questions about the value, commitment and satisfaction of their sexual agreements. The SAIS is an important new measure because it addresses how sexual agreements among gay male couples might impact other factors in their relationship, such as commitment and intimacy (Neilands, Chakravarty, Darbes, Beougher, & Hoff, 2009), which in turn, may affect their risk for HIV infection. As such, SAIS will provide much needed information to better understand the attitudes that gay men have about their sexual agreements.

In addition to breaks in sexual agreements, other HIV risk factors have been associated with gay male couples, including difficulty communicating about sexual desires (Lewis et al., 2006; Prestage et al., 2006) and unknown or assumption of

partners' HIV status (Elford et al., 1999; Hoff & Beougher, 2008). Although sexual

agreements may provide a strategy for gay male couples to reduce their risk for HIV,

other relationship dynamics and characteristics may hinder the effectiveness of these

agreements and thereby, increase HIV risk. Because gay men are acquiring HIV from

their main partners, it is important to understand how previous studies have

investigated this public health problem. The methods and analyses used in previous

studies of gay male couple will be addressed in the next section.

Limitations of Prior Research with Gay Couples

A small number of studies have been conducted to further investigate this

public health problem. From this small body of literature, several limitations have

been identified including: 1) use of individual-level variables, 2) non-dyadic data

collection, and 3) limited analyses available. This section will address each of these

limitations and provide recommendations for research to better understand and address

this public health problem.

Most sexual behaviors occur in the context of two people and in this case, two

gay men in a relationship. One limitation presented in many gay, bisexual, and other

MSM HIV risk related research studies is the use of only individual-level variables.

Individual-level variables derived from constructs found in theories and models used

for explaining individual HIV risk behaviors limit the scope of dyad research by

discounting interpersonal interactions and influences occurring in gay couples. More

appropriate theories, models, and scales exist to help predict and explain dyadic

interdependent behavior among gay couples. Examples of such theoretical

frameworks, models, and scales, include the Theory of Interdependence (Kelley et al., 2003; Kelley & Thibaut, 1978; Thibaut & Kelley, 1959), Investment Model (Davidovich et al., 2006; Rusbult, 1980; Rusbult et al., 1998), and Sexual Agreement Investment Scale (Neilands et al., 2009). Future research on gay couples and HIV risk must include more appropriate theoretical frameworks, models, and scales to account for interdependent behavior.

Another common limitation found with previous research with gay couples is non-dyadic data collection. Non-dyadic data collection involves collecting data from one member of the dyad, in this case, one male among the gay couples. Several studies investigating HIV risk among gay couples used non-dyadic data collection to investigate the sexual behaviors and relational factors within the dyad (Crawford et al., 2003; Davidovich et al., 2000; 2004; 2006; Davidovich et al., 2001; de Vroome et al., 2000; Hoff et al., 1996; Klausner et al., 2006; Moreau-Gruet et al., 2001; Prestage et al., 2006; Prestage et al., 2008; Van de Ven et al., 2005). Other studies collected data from both partners (Appleby et al., 1999; Boesch et al., 2007; Fergus et al., 2005; Hoff & Beougher, 2008; Hoff et al., 2009; Kurdek, 2007; LaSala, 2004a; 2004b; Lewis et al., 2006; McNeal, 1997; Wagner et al., 2000; Worth et al., 2002). It is important to collect data from both partners for several reasons. In general, non-dyadic data collection discounts that sexual behavior is interdependent, meaning it involves and requires both members. Second, data from both partners can be used to better understand how one member of the dyad influence's the other on their sexual behaviors, relationship characteristics, and relationship dynamics. Third, information

from both partners could be used to determine whether relationship dynamics are concordant based on each member's response. Lastly, using dyadic data collection methods will allow researchers to better understand and predict if and how which relationship characteristics and dynamics contribute to HIV risk among gay couples. Using non-dyadic data collection methods limits the ability to accurately measure relationship characteristics and dynamics among gay couples.

Another limitation shared by previous studies of gay couples was the unavailability of analytical techniques to analyze dyadic data of indistinguishable dyads. Prior to 2006, quantitative research with gay male couples was limited to collecting individual-level data and using standard statistical methods in order to better understand HIV risk among gay men and their main sexual partners. Using an individual-level approach discounts the interdependent effects that exist between members within a gay male couple (Kenny et al., 2006) as well as the ability to determine whether partners concurred on relationship dynamics including sexual risk behaviors (Hoff & Beougher, 2008). Analytical techniques were available for dyadic data of distinguishable dyads, such as a heterosexual couple, because the characteristic of gender was a reliable method to distinguish the responses between the two members within the dyad.

Recent advances by Kenny et al. (2006) have detailed a series of alternative analyses for measuring and detecting interdependence effects among gay couples by using multilevel modeling (Campbell & Kashy, 2002) for the Actor Partner Interdependence Model (APIM) (Kasky & Kenny, 2000). The main advantage for

using multilevel modeling to estimate the APIM is it allows researchers to determine which relationship dynamics and characteristics among gay couple's effect each partner's risk for HIV. In addition, multilevel modeling also allows researchers to consecutively analyze relationship factors that are between and within dyad differences for dyad-level and individual-level factors for predicting sexual risk behaviors and HIV risk.

In summary, research that utilizes appropriate theories and models for examining the association of relationship characteristics and dynamics on sexual risk behaviors and HIV risk among gay couples is urgently needed. Dyadic data must be collected in order to measure and assess how relationship characteristics and dynamics affect sexual risk taking among gay couples. Dyadic data will also be needed for investigating which relationship characteristics and dynamics among gay couple's affect each partner's risk for HIV by using multilevel modeling for the APIM.

Summary

As more gay men in relationships acquire HIV from their main partners, new research is needed to better understand if and how relationship dynamics among gay couples are associated with sexual risk taking. Previous studies have used theoretical constructs, HIV risk reduction models, and methodologies that emphasized an individualistic approach, thereby limiting the scope and ability to explain and predict sexual risk behavior among dyads. These limitations support the need for future research that uses an interpersonal perspective to address these gaps in order to better understand if and how relationship characteristics and dynamics influence sexual risk

behaviors among gay couples.

Accordingly, the present study incorporated an interpersonal approach with the *overall goal to better understand how relationship characteristics and dynamics among gay couples influence their sexual behaviors.* Specifically, relationship characteristics of type, length, cohabitation, trust and Investment Model's commitment were examined for their association with sexual risk taking and HIV risk among gay couples. For relationship dynamics, communication about HIV status, sexual agreement, and understanding of sexual agreement were investigated to determine their association with sexual risk taking and HIV risk among gay couples. In addition, previously identified individual-level predictors of sexual behavior (TPB constructs of attitudes, intentions and perceived behavioral control for condom use) were also used to determine their association of sexual risk taking and HIV risk among gay couples. Furthermore, data were collected from each indistinguishable member for all sexual dyads. Dyadic data collection and the use of multilevel modeling were essential for measuring interdependent effects of individual and relationship characteristics and dynamics on risky sexual behaviors and overall HIV risk.

The present study had four objectives:

Obj1. Evaluate the extent to which gay male couples made their agreements to be monogamous and the extent to which partners concurred that they had made and kept such an agreement.

Obj2. Determine which dyad-level factors – including characteristics and relationship dynamics – are most strongly associated with high HIV risk and UAI with non-main partners.

Obj3. Determine which dyad-level factors – including characteristics and relationship dynamics – are most strongly associated with the sexual agreement to be monogamous.

Obj4. Assess whether an individual's reported trust level, relationship commitment, sexual agreement, HIV risk were influenced by his partner's reported trust level, relationship commitment, sexual agreement, and HIV risk.

Methods used to examine these objectives will be discussed next.

CHAPTER 3: METHODS

Overview

A cross-sectional study design was used for examining the association of individual factors (e.g. Theory of Planned Behavior constructs) and relationship characteristics and dynamics (e.g. trust, commitment, sexual agreements) with sexual risk behavior among gay couples. I used a standard reciprocal dyadic design to collect from both members of a sexual dyad with each member completing a self-administered electronic questionnaire. A description of the target population, inclusion criteria, sample size, data collection procedures, instrument and measures, data preparation, management, and analysis are provided in the following sections.

Target Population, Research Setting, and Sample

In order to better understand how relationship dynamics affect sexual risk taking among gay men, the present study targeted gay men in same-sex relationships (i.e. gay couples). In particular, men who self-identify as gay, homosexual, bisexual or queer and were in a sexual relationship with a similar man were specifically targeted for the study.

Target Population

To participate in the present study respondents had to be: 1) English speaking; 2) HIV negative or have unknown HIV status; 3) a man who self identified as gay, bisexual, queer, or homosexual; 4) eighteen years of age and older; 5) able to follow simple online instructions to complete an electronic survey on a computer; 6) in a sexual relationship with another man who also identified as gay, bisexual,

homosexual, or queer of at least three months; and 7) sexually active with having had

anal intercourse within the last three months during the time of study recruitment.

Both members of the gay couple had to meet all inclusion criteria to enroll in the

present study.

Men in a same-sex relationship were excluded from the present study if they:

1) did not self identify as either gay, bisexual, homosexual, or queer male; 2) were

younger than eighteen years; 3) had been in his relationship less than three months; 4)

did not have anal intercourse within the last three months; or 5) had a HIV/AIDS

diagnosis. If one partner of the couple did not qualify, then both members of the dyad

were ineligible to participate in the study. Study participants were also excluded from

the study if more than 20% of their survey questions were incomplete. If a respondent

did not want to complete the survey after reading the electronic consent form, he then

had the opportunity to indicate this and was directed to a page that thanked him for his

time. His partner was subsequently disqualified from the study.

Research setting, recruitment and screening procedures

In the report, *Geographic Trends Among Same-Sex Couples in the U.S. Census

and the American Survey*, the Williams Institute ranked Seattle, WA second and

Portland, OR fourth for having the highest same-sex couples per thousand households

(Gates, 2007). The research setting was chosen because of the large number of same-

sex couples residing in these two Pacific Northwest metropolitan areas. A variety of

recruitment strategies were used to obtain the sample size of 144 gay male couples.

Strategies included distribution of business cards and invites via email to profiles

located on selected websites frequented by gay men in the Pacific Northwest. Business cards had the following information printed on them: 1) study name, 2) brief description, 3) eligibility criteria, and 4) contact information. Gay couples interested in participating in the study used the card to contact the principal investigator (PI) for more information. The business cards were also distributed at various community events between the months of June and November in 2009.

The PI also searched through social website profiles to send electronic invitations to males who met the eligibility criteria of gay-related identity, negative or unknown HIV serostatus, over 18 years of age, and in a relationship. Electronic invites were sent to profiles on websites of http://www.gay.com, http://www.manhunt.net, and http://www.realjock.com. Every profile that met those four conditions was sent a study invitation by e-mail. The e-mail contained a brief study description, eligibility requirements, along with information on how to contact the PI for study participation.

Other recruitment strategies consisted of snowball methods and referrals from local organizations providing social services to gay men in the Pacific Northwest. Three organizations helped to refer gay couples, including Gay City in Seattle and Q Center and Men's Wellness Center of Cascade AIDS Project in Portland. Interested gay couples that contacted the PI about the study were encouraged to refer other gay couples to participate as a form of respondent driven sampling.

Each couple that participated in the study was asked if they had read the study eligibility requirements before setting up a survey appointment with the PI. All contacts regarding study inquiries and appointment scheduling were kept confidential

and deleted after the couple completed the electronic questionnaire. Contacts that were made to inquire about the study were also immediately deleted if an appointment was not scheduled after several attempts or after the couple had indicated a lost of interest to participate in the study. The majority of survey appointments occurred at either a health center or a local coffee cafe.

Sample Size and Power Estimates

Sample size and power considerations for estimating effects among indistinguishable dyads were determined using recommendations described by Kenny et al. (2006). Indistinguishable dyads are defined when two members of a relational dyad lack a meaningful factor for distinguishing them apart (Kenny et al., 2006), as in the case of gay couples. The present study recruited a sample size of 144 gay male couples from Portland, Oregon and Seattle, Washington. In order to achieve a power of 0.95 to measure a two-tail test of consequential nonindepenence, Kenny et al. recommended a sample size of 140 dyads with a medium population correlation value of 0.3 and an alpha set at 0.05 (2006). Testing for consequential nonindependence was necessary to reduce the probability of committing a type I error, the probability of rejecting the null hypothesis when the null hypothesis is true. Because multiple logistic regression was used to detect dyad-level between-couple effects, power was estimated to be 0.80 with alpha set at 0.05 and an assumed multiple correlation of .30 among the predictors for each of the models (Hsieh, Bloch, & Larsen, 1998). Based on recommendations and guidelines provided by Kenny et al., power was also estimated

to be 0.80 with alpha set at 0.05 for a minimum effect size of 0.50 for estimating actor-partner effects (2006).

Data Collection

Procedures

Once both members of the sexual dyad met the inclusion criteria, the couple was invited to make an appointment to complete an electronic survey at a predetermined location under the supervision of the PI. Each qualified male in the couple was then given an identification number of four digits for tracking purposes. The two numbers were specific for each qualified couple and differed between the members of the sexual dyad. For example, a gay male was given the number 0011 and his partner was given the number 0012. The next gay couple was then given the numbers 0021 and 0022. The same format was followed until the sample size for the study had been reached. In addition, previous research indicated decreased measurement error and participation bias when study participants identity remained anonymous when asked sensitive questions (Catania, Gibson, Chitwood, & Coates, 1990). As such, the present study did not collect any personal identifying information in the survey instrument.

Each member of the sexual dyad took between 15 to 35 minutes to read the electronic consent form (Appendix A) and complete the electronic survey (Appendix B). At any given time, the participant could decline participation in the study and as such, the responses from that sexual dyad were eliminated from the data. After data

were collected from 144 dyads, the study recruitment phase closed. The following

section describes the data collection instrument and measures used in data collection.

Data Collection Instrument and Measures

Measures from previous studies of gay couples were adapted for the present

study with the exception of demographic questions. Approval from Oregon State

University Internal Review Board (IRB) was granted on June 10, 2009. Upon IRB

approval, snowball sampling method was used to obtain three couples that met the

inclusion criteria to participate in a focus group. The focus group provided feedback

on the survey structure and question format. Revisions were made based on this

feedback. The electronic survey was then uploaded onto an electronic webpage and

host server, http://www.surveymonkey.com. The study data were collected and stored

by the host server.

Independent variables. The independent variables in this study were

categorized by individual factors, relationship characteristics, or relationship

dynamics. The independent predictor variables for the individual factors were taken

from constructs of the Theory of Planned Behavior (TPB) and included attitudes,

subjective norms, perceived behavioral control, and intentions on condom use (Ajzen,

1991). Measures for the four TPB constructs were adapted from previous studies

among gay men and were found to be reliable for predicting future condom use

(Davidovich et al., 2004; de Vroome et al., 2000; Janssen, de Wit, Stroebe, &

Griensven, 2000; Kok, Hospers, Harterink, & de Zwart, 2007). Accordingly, the

present study used the same measures to assess individual factors among gay men in the study sample (Janssen et al., 2000).

  Individual factors: TPB constructs. Participants were asked to respond to questions representing each TPB construct with respect to his on-going main sexual partner (e.g. boyfriend) and other non-main sexual partners. A total of nine questions were asked for measuring the four constructs of TPB for planned condom use within the next three months. The present study did not specifically measure the reliabilities for each TPB construct due to too few items to perform a reliability analysis. A mean score and standard deviation was computed for all nine questions for each individual and couple. Averaging the partner scores within each couple was used to compute the couple-level mean score and standard deviation. Specific details on each of the TPB constructs are described below.

  Intention to use condoms. Intention to use condoms assessed each dyad member's intention to use condoms in the next three months with his main sexual partner and other sexual partners. Intention to use condoms was measured by using two questions. One question addressed intention to use condoms with main partner and the response options for individuals ranged from 1 to 7 whereas response options for couples ranged from 1 to 7. The second question addressed intention to use condoms with other sexual partners and the response options for individuals ranged from 1 to 7 whereas response options for couples ranged from 3.5 to 7. Each question was rated on a 7-point Likert-type response scale with 1 = I most certainly do not and 7 = I most certainly do.

The individual and couple-level mean scores and standard deviations for intention to use condoms with main partner were 2.30 (1.86) and 2.29 (1.66), respectively; indicating men and couples had lower intentions of using condoms with their main partner. The individual and couple-level mean scores and standard deviations for intention to use condoms with other sexual partners were 6.56 (1.28) and 6.56 (0.90), respectively; suggesting men and couples had higher intentions to use condoms with other sexual partners.

Attitude toward using condoms. Attitude toward using condoms assessed each dyad member's thought about using condoms in the next three months with his main sexual partner and other sexual partners. Attitude toward using condoms was asked with two questions. One question addressed attitude toward condom use with main partner and individuals had a response range from 1 to 7 whereas couples had a response range from 1 to 7. The second question asked about attitude toward condom use with other sexual partners and individuals had a response range from 1 to 7 whereas couples had a response range from 4 to 7. Each question was rated on a 7-point Likert-type response scale with 1 = I think it is very unimportant and 7 = very important.

The individual and couple-level mean scores and standard deviations for attitude toward future condom use with main partner were 2.34 (1.81) and 2.34 (1.55), respectively; suggesting that men and couples had a lower attitude about using condoms with their main partner. The individual and couple-level mean scores and standard deviations for attitude toward future condom use with other sexual partners

were 6.82 (0.74) and 6.81 (0.52), respectively; indicating that men and couples had a

higher attitude about using condoms with other sexual partners.

Social norms regarding condom use. Social norms regarding condom use

assessed each dyad member's perception on how his peers would feel about him using

condoms with his main sexual partner and other sexual partners. Social norms

regarding condom use were asked with three questions. One question addressed social

norms regarding future condom use with main partner and individuals had a response

range from 1 to 7 whereas couples had a response range from 2.5 to 7. The second

question addressed social norms regarding future condom use with other sexual

partners and individuals had a response range from 1 to 7 whereas couples had a

response range from 2.5 to 7. Both questions were assessed on a 7-point Likert-type

response scale with -3 = They would disapprove and 3 = They would approve and

were then recoded to a 1 to 7 Likert-type response scale with 1 = They would

disapprove and 7 = They would approve for analysis purposes. The third question

asked about how they valued their gay friends opinions and was assessed using a 7-

point Likert-type response scale with 1 = Not at all and 7 = Very much; response

options for individuals ranged from 1 to 7 whereas response options for couples

ranged from 1.5 to 7.

The individual and couple-level mean scores and standard deviations for

valued opinion of gay friends were 5.02 (1.39) and 5.03 (1.03), respectively; men and

couples valued the opinion of their gay friends more than neutral, but less than very

much. The individual and couple-level mean scores and standard deviations for social

norm regarding future condom use with main partner were 4.96 (1.51) and 4.96 (1.13), respectively; men and couples perceived their peers to slightly approve of their future condom use with their main partner. The individual and couple-level mean scores and standard deviations for social norm regarding future condom use with other sexual partners were 6.49 (1.28) and 6.49 (0.91), respectively; men and couples perceived their peers to almost fully approve of their future condom use with other sexual partners.

Perceived behavioral control over using condoms. Perceived behavioral control over using condoms assessed each dyad member's perceived ability to use condoms in the next three months with his main sexual partner and other sexual partners. Perceived behavioral control over using condoms was asked with two questions. One question assessed perceived behavioral control over using condoms with the main partner with an individual response range of 1 to 7 whereas couples had a response range from 1 to 7. The second question assessed perceived behavioral control over using condoms with other sexual partners with an individual response range of 1 to 7 and couples had a response range from 4 to 7. Each question was examined using a 7-point Likert-type response scale with 1 = most certainly do not and 7 = I most certainly do.

The individual and couple-level mean scores and standard deviations for perceived behavioral control over using condoms with main partner were 5.33 (2.10) and 5.33 (1.72), respectively; men and couples perceived themselves as fairly able to use a condom with their main partner. The individual and couple-level mean scores

and standard deviations for perceived behavioral control over using condoms with other sexual partners were 6.79 (0.88) and 6.79 (0.61), respectively; men and couples perceived themselves to be most able to use condoms with other sexual partners.

In addition to examining individual factors by using the four TPB constructs, relationship characteristics of trust and relationship commitment were also examined. The next two sections describe each relationship characteristic in detail.

Relationship characteristic: Trust scale. The Trust Scale (Rempel, Holmes, & Zanna, 1985) was used to assess the degree to which individuals had faith in their romantic partners and viewed their partners as dependable and predictable. The scale consisted of the following three subscales for measuring trust within close interpersonal relationships: predictability emphasized the consistency and stability of a partner's specific behaviors based on past experience; dependability concentrated on the dispositional qualities of the partner which warranted confidence in the face of risk and potential hurt; and faith centered on feelings of confidence in the relationship and the responsiveness and caring expected from the partner in the face of a uncertain future (Rempel et al., 1985).

Participants were asked to respond to the Trust Scale with respect to his on-going sexual partner (i.e., boyfriend). This 17 item validated measure with an overall reliability of .89 (Rempel et al., 1985; Rusbult et al., 1998) contained three subscales that assessed each component of the Trust Scale including, predictability, dependability and faith. The present study, however, had a reliability of 0.87 for the Trust Scale. Reliability for each of the subscales typically ranged between .74 and .82

in previous studies (Rempel et al., 1985; Rusbult et al., 1998). After certain scale items were reverse coded, a mean score and standard deviation was computed for all three subscales for each individual and couple. Averaging the partner scores within each couple was used to compute the couple-level mean score and standard deviation. Specific details on the Trust subscales are described below.

Predictability. Predictability of trust was measured using a five-item scale and had a reliability of 0.71. Each item was rated on a 7-point Likert-type response scale with -3 = Strongly Disagree and 3 = Strongly Agree; response options for individuals ranged from -3 to 3 whereas response options for couples ranged from -2.1 to 3. The individual and couple-level mean scores and standard deviations for predictability were 1.36 (1.16) and 1.36 (0.91), respectively. On average, men and couples reported they mostly agreed that their main partner was predictable with regards to being trustworthy.

Dependability. Dependability of trust was measured using a five-item scale and had a reliability of 0.68. Each item was rated on a 7-point Likert-type response scale with -3 = Strongly Disagree and 3 = Strongly Agree; response options for individuals ranged from -2.8 to 3 whereas response options for couples ranged from -1.8 to 2.8. The individual and couple-level mean scores and standard deviations for dependability were 1.36 (1.10) and 1.36 (0.86), respectively. On average, men and couples reported they mostly agreed that their main partner was dependable with regards to being trustworthy.

Faith. Faith related to trust was measured using a seven-item scale and had a reliability of 0.86. Each item was rated on a 7-point Likert-type response scale with -3 = Strongly Disagree and 3 = Strongly Agree; response options for individuals ranged from -2.6 to 3 whereas response options for couples ranged from -1.4 to 3. The individual and couple-level mean scores and standard deviations for faith were 1.91 (0.93) and 1.91 (0.76), respectively. On average, men and couples reported they mostly agreed about having faith in their main partner with regards to being trustworthy.

Relationship commitment: Investment model scale. Rusbult's Investment Model Scale (1998) was used to measure relationship commitment among gay couples. Relationship commitment is the product of three components: relationship satisfaction, investment, and alternatives (Le & Agnew, 2003). Items and scales used to measure relationship commitment from Rusbult's Investment Model have previously been tested among gay couples (Buunk & Bakker, 1997; Davidovich et al., 2006). The items and scales used by Davidovich et al. (2006) to measure relationship commitment were adapted for the present study.

Participants were asked to respond to the Investment Model Scale with respect to their on-going sexual partner (i.e., boyfriend). This 22-item validated measure (Davidovich et al., 2006; Rusbult et al., 1998) contained four subscales that assessed each component of the Investment Model. Reliabilities for each of the subscales typically ranged between .73 and .95 in previous studies (Davidovich et al., 2006, Rusbult et al., 1998). The present study, however, had a reliability of 0.87 for the

Investment Model. After certain scale items were reverse coded, a mean score and standard deviation was computed for all four subscales for each individual and couple. Averaging the partner scores within each couple was used to compute the couple-level mean score and standard deviation. Specific details on the Investment Model subscales are described below.

Commitment level. Commitment level for the sexual relationship was measured using a seven-item scale and had a reliability of 0.78. Each item was rated on a 7-point Likert-type response scale with 0 = Do Not Agree at All and 6 = Agree Completely; response options for individuals ranged from 2.1 to 6 whereas response options for couples ranged from 3.1 to 6. The individual and couple-level mean scores and standard deviations for commitment level were 5.40 (0.77) and 5.40 (0.64), respectively. On average, both individual men and couples reported they were close to completely agreeing about having a high level of commitment toward their sexual relationship with their main partner.

Satisfaction level. Satisfaction level of the sexual relationship was measured using a five-item scale and had a reliability of 0.87. Each item was rated on a 7-point Likert-type response scale with 0 = Do Not Agree at All and 6 = Agree Completely; response options for individuals ranged from 1.2 to 6 whereas response options for couples ranged from 2.1 to 6. The individual and couple-level mean scores and standard deviations for satisfaction level were 4.79 (0.97) and 4.79 (0.82), respectively. On average, both individual men and couples reported they were

relatively close to completely agreeing about having a high level of satisfaction with their sexual relationship with their main partner.

Quality of alternatives. Quality of alternatives to the sexual relationship was measured using a five-item scale and had a reliability of 0.75. Each item was rated on a 7-point Likert-type response scale with 0 = Do Not Agree at All and 6 = Agree Completely; response options for individuals ranged from 0.6 to 6 whereas response options for couples ranged from 0.9 to 5.9. The individual and couple-level mean scores and standard deviations for quality of alternatives were 3.38 (1.11) and 2.62 (0.86), respectively. On average, individual men reported they had a slightly above neutral agreement on quality of alternatives with regard to their sexual relationship with their main partner. On average, couples reported a slightly below neutral agreement on quality of alternatives with regard to their sexual relationship with their main partner.

Investment size. Investment size of the sexual relationship was measured using a five-item scale and had a reliability of 0.71. Each item was rated on a 7-point Likert-type response scale with 0 = Do Not Agree at All and 6 = Agree Completely; response options for individuals ranged from 0.6 to 6 whereas response options for couples ranged from 1.3 to 6. The individual and couple-level mean scores and standard deviations for investment size were 4.66 (0.86) and 4.66 (0.70), respectively. On average, both individual men and couples reported they were relatively close to completely agreeing about the size of their investments in their sexual relationship with their main partner.

Relationship dynamics: Sexual agreement investment scale (SAIS). The independent variable used to measure relationship dynamic was the Sexual Agreement Investment Scale (SAIS). The SAIS (Neilands et al., 2009) assessed each participant's investment in the sexual agreement he had made with his partner. Three domains are included in SAIS: value of the agreement, commitment to the agreement, and satisfaction with the agreement. Each male who reported having a sexual agreement and each couple who were concordant about having a sexual agreement had a score for each of the three subscales of the SAIS.

Participants were asked to respond to the Sexual Agreement Investment Scale with respect to his on-going sexual partner (i.e., boyfriend). This 13-item validated measure (Neilands et al., 2009) contained three subscales that assessed each component of the SAIS. Internal reliability for the 13 item SAIS had been reported high; Raykov's coefficient $\rho = .95$ (Neilands et al., 2009). The present study, however, had a reliability of 0.94 for the SAIS. A mean score and standard deviation was computed for all three subscales for each individual and concordant couple. Averaging the partner scores within each couple was used to compute the couple-level mean score and standard deviation. Specific details on the SAIS subscales are described below.

Value. Value of the current sexual agreement was measured by using a six-item scale and had a reliability of 0.92. Each item was rated on a 5-point Likert-type response scale with 0 = Not at All and 4 =Extremely; response options for individuals ranged from 1 to 4 whereas response options for couples ranged from 1.8 to 4. The

individual and couple-level mean scores and standard deviations for value of sexual agreement were 3.35 (0.70) and 3.40 (0.54), respectively. On average, both individual men and couples reported they were relatively high in agreement on valuing their sexual agreement with their main partner.

Commitment. Commitment to the current sexual agreement was measured by using a four-item scale and had a reliability of 0.90. Each item was rated on a 5-point Likert-type response scale with 0 = Not at All and 4 = Extremely; response options for individuals ranged from 0.8 to 4 whereas response options for couples ranged from 1.6 to 4. The individual and couple-level mean scores and standard deviations for commitment to sexual agreement were 3.00 (0.82) and 3.49 (0.50), respectively. On average, men reported they were fairly committed to their sexual agreement with their main partner while couples reported a higher level of commitment to their sexual agreement with their main partner.

Satisfaction. Satisfaction with the current sexual agreement was measured by using a three-item scale and had a reliability of 0.80. Each item was rated on a 5-point Likert-type response scale with 0 = Not at All and 4 = Extremely; response options for individuals ranged from 0.3 to 4 whereas response options for couples ranged from 1 to 4. The individual and couple-level mean scores and standard deviations for satisfaction to sexual agreement were 3.47 (0.65) and 3.08 (0.57), respectively. On average, men reported they were mostly satisfied with their sexual agreement with their main partner while couples reported a lower level of satisfaction to their sexual agreement with their main partner.

In addition, members of each sexual dyad were asked communication-related questions on HIV risk. Questions were on the following topics: sexual agreement transparency, sexual agreement break, understanding of sexual agreement, awareness of one's own and partners' HIV status, approximate time frame of last HIV test, and whether unprotected anal intercourse had occurred within the last three months with main partner and other extradyadic partners. The sexual agreement transparency had one question asking each dyad member if the sexual agreement was "implied" or "explicit" as answers to select. The question on sexual agreement break asked each dyad member whether he had broken his agreement with a choice of "yes", "no," or "not sure." One question asked on understanding of sexual agreement to determine whether each dyad member understood the sexual agreement within his relationship with the option of either "yes", "no", or "not sure." Similarly, two questions were asked to each dyad member to assess the awareness of HIV status: 1) himself with the dichotomous option of either "yes" or "no" and 2) and partner with the dichotomous option of either "yes" or "no." Lastly, two questions were asked to each dyad member to determine whether unprotected anal intercourse had occurred within the last three months with: 1) main partner with the dichotomous option of either "yes" or "no" and 2) other extradyadic partners with the dichotomous option of either "yes" or "no." Answers to communication-related questions on HIV risk provided additional information on what types of information each dyad member shared with his sexual partner. Moreover, questions within this subset highlighted the level of concordance and parity within and among the sexual dyads.

Outcome measure. The outcome variable used was adapted from a recently published study on community integration and HIV risk among gay couples (Fergus et al., 2009). The present study used a dichotomous outcome variable that collected information on each dyad member's sexual risk behavior by using three separate measures. In detail, the three measures used to determine HIV risk among each study participant and dyad, included: (a) whether one or both individuals in the couple reported UAI within the last three months with a secondary partner, (b) whether the couple reported UAI with each other within the last three months, and (c) the reported HIV serostatus of each dyad member. In addition, each individual and respective couple was labeled as either " high risk" or "low risk" for potential HIV transmission according to the aforementioned criteria. Table 1 describes how each study participant and dyad was classified according to his and their self-reported sexual risk behavior and current HIV status. If one dyad member risk differed from his partner's, then that dyad was labeled as " high risk." Criteria used for the present study's outcome variable also helped to detect concordance of risky sexual behavior in each dyad.

Table 1. Criteria Used for Constructing the Dependent Variable, HIV Risk

	Criteria			
HIV Risk	*UAI w/ primary*	*UAI w/ secondary*	*HIV status unknown*	*No UAI*
High	X	X	X	
High	X	X		
High	X		X	
Low	X			
Low		X		
Low				X
Low			X	X

Besides assessing the independent and dependent variables, the present study also collected demographic and background information from each of the study participants. Demographic information and relationship characteristics collected included, sexual identity, age, race, ethnicity, highest education-level achieved, employment status, personal income, recruitment city, cohabitation, length of cohabitation, length of relationship, relationship type, sexual agreement type, and reported HIV status. Each member of the dyad was asked to identify his own HIV status as well as his presumed partner's HIV status.

Data Management and Preparation

After 144 dyads completed the electronic survey, data were downloaded from the Internet server onto a MS Excel spreadsheet and then transferred to Stata for data management and analysis preparation. Data were then screened for missing values and adjusted accordingly based on recommendations made by Acock (2005). Data that contained written responses were recoded numerically for appropriate dyadic analysis. Some categorical variables were collapsed and recoded into a binary format to be analyzed for logistic regression. Certain scale items in the Trust and Investment Model measures were then reverse coded for analytical purposes. Row means, sum totals, and dyad-level averages were calculated for each measure and various demographic descriptors. Based on recommendations from Kenny et al., data were copied and arranged in two different database formats for appropriate analytical techniques (2006). Data were arranged in a wide and pairwise format.

Data arranged in the wide format had scores for each dyad member on the same record in the database. Data arranged in the wide format were used for the following analytical techniques: factor analysis, Cronbach's alpha, descriptive statistics, and dyad-level OLS logistic regression. Data in the second database were arranged in a pairwise structure (Kenny et al., 2006). Data arranged in the pairwise format were necessary for analyzing actor-partner effects using the Actor-Partner Interdependence Model framework.

Analysis

Data from 142 dyads were analyzed using Stata v11 and SAS v9.2. Factor analysis, Cronbach's alpha, and OLS logistic regression were calculated using Stata as were frequencies, percentiles, dyad-level averages, and means to describe the sample. SAS v9.2 was used to calculate actor-partner effects with the Actor Partner Interdependence framework. The next section describes which analytical techniques were used to assess each study objective and hypothesis.

Objective 1 and Hypotheses

Obj1. Evaluate the extent to which gay male couples made their agreements to be monogamous and the extent to which partners concurred that they had made and kept such an agreement.

Hyp1a. Gay male couples will make their sexual agreement to be monogamous.

Hyp1b. The majority of partners among gay male couples will concur and have kept their sexual agreement to be monogamous.

Data in the wide dataset were used to perform descriptive statistics. Data from each dyad member were compared to determine the proportion of dyads that made a sexual agreement, chose their sexual agreement to be monogamous, and among the monogamous couples, who kept their sexual agreement. Percentages from the proportions were then calculated to evaluate objective 1 and assess both hypotheses.

Objective 2 and Hypothesis

Obj2. Determine which dyad-level factors – including characteristics and relationship dynamics – are most strongly associated with high HIV risk and UAI with non-main partners.

Hyp2. Dyad-level characteristics and relationship dynamics will be associated with high HIV risk and having UAI with non-main partners.

Ordinary least squares logistic regression was used to identify which dyad-level characteristics and relationship dynamics predicted high HIV risk among gay male couples. Theoretical underpinnings and findings from previous studies were used to determine which dyad-level factors to examine for predicting high HIV risk. Averages for the predetermined relationship characteristics and dynamics were calculated by using scores from each dyad member in the wide dataset; all predictors were dyad-level factors.

Bivariate analyses were conducted to compare high and low HIV risk among gay male couples on age; employment status; cohabitation; relationship duration; concurrency on sexual agreement; Trust Scale measures for predictability, dependability, and faith; Investment Model measures for relationship commitment,

satisfaction, investment, and quality of alternatives; Theory of Planned Behavior constructs of attitude, intention and perceived behavioral control regarding future condom use with main and other sex partners; and Sexual Agreement Investment Scale measures for commitment, satisfaction, and value. Statistical significance ($p<0.05$) of group differences was assessed using the Pearson chi-square test and Fisher's exact test for categorical variables and the independent t-test for mean differences for continuous variables. The Mann-Whitney rank-sum test was used to assess group differences for continuous variables that were highly skewed with a skewness greater than three. Continuous variables that had a skewness greater than three included attitude, intention, and perceived behavioral control on future condom use other sexual partners.

Variables that differed significantly in bivariate analyses were first analyzed for multicollinearity issues before being considered for inclusion as independent variables in the logistic model. Multiple logistic regression was then performed to assess associations between high HIV risk and selected characteristics. Having a high HIV risk (vs. low HIV risk) was the dependent variable. Odds ratios and their associated 95% confidence intervals were then reported.

A similar analytical approach was used to identify which dyad-level characteristics and relationship dynamics predicted UAI with non-main partners among gay male couples. Results from each analysis were then used to address the second objective and hypothesis.

Objective 3 and Hypothesis

Obj3. Determine which dyad-level factors – including characteristics and relationship dynamics – are most strongly associated with the sexual agreement to be monogamous.

Hyp3. Dyad-level characteristics and relationship dynamics will be associated with the sexual agreement to be monogamous.

A similar analytical approach that was used to assess the second objective and hypothesis was also used to examine the third objective and hypothesis. Bivariate analyses were conducted to compare sexual agreement of monogamy and non-monogamy agreements among gay male couples on age; relationship duration; UAI with main partner; understanding agreement; Trust Scale measures for predictability, dependability, and faith; Investment Model measures for relationship commitment, satisfaction, investment, and quality of alternatives; and Sexual Agreement Investment Scale measures for commitment, satisfaction, and value. Variables that differed significantly in bivariate analyses were first analyzed for multicollinearity issues before being considered for inclusion as independent variables in the multiple logistic model. Two variables were found to be highly correlated (0.84) for predicting sexual agreement to be monogamous: value and commitment to investment in sexual agreement; value to investment in sexual agreement was excluded from the analysis. Multiple logistic regression was then performed to assess associations between monogamy and non-monogamous sexual agreements and selected characteristics. Having a sexual agreement of monogamy (vs. non-monogamous sexual agreement)

was the dependent variable. Odds ratios and their associated 95% confidence intervals were then reported. Results from the analysis were used to examine the third objective and hypothesis.

Objective 4 and Hypothesis

> **Obj4.** Assess whether an individual's reported trust level, relationship commitment, sexual agreement, HIV risk were influenced by his partner's reported trust level, relationship commitment, sexual agreement, and HIV risk.

> **Hyp4.** Actor outcome measures will be positively associated with partner outcome measures.

Actor and partner effects were estimated through a series of multilevel modeling (MLM) procedures with the statistical program SAS v9.2. All MLM procedure codes used to generate actor-partner effects are listed in Table 2. McMahon et al. provided a detailed guide on MLM of dyadic data with binary outcomes for the Actor Partner Interdependence Model framework (2006). Instructions from this guide were followed for the present study. A test for within-dyad interdependence was performed with the outcome variable to produce an intraclass correlation coefficient with 95% confidence limits. The intraclass correlation coefficient was significant which indicated there was within-cluster interdependence and that the use of a multilevel model was necessary. The SAS procedure code used for this test was PROC FREQ.

A second model was then produced to generate parameters for the final conditional random intercepts model. First, a random intercepts' variance estimate was

obtained from the fixed model through the PROC MIXED procedure. The random intercepts' variance estimate is an indicator for the between-cluster variance or variance due to dyads. The second model was then created through a marginal modeling approach by using generalized estimating equations (GEE). The second model (GENMOD) produced starting values of the intercept and slope parameters for the final conditional random intercepts model.

The final model incorporated the random intercepts' variance estimate (s2u) and intercept and slope parameters (beta0, beta1, etc.) from the two proceeding models, proc mixed and genmod respectively. The NLMIXED procedure code for SAS was used to generate the final model, along with these additional analytical options; quadrature points (QPOINTS) were added to obtain integral approximations over the random effects and an optomization technique (TECH) called Newton-Raphson algorithm (NEWRAP) was used to ensure the reliability in estimating the parameters. The parameter estimates produced from the final conditional random intercepts model were used to detect the actor and partner effects. Standard errors, degrees of freedom, t value, significant testing of t, alpha level, and lower and upper 95% confidence limits were also provided for each of the parameter estimates in the final model.

Table 2. SAS v9.2 Procedure Codes for Estimating Actor-Partner Effects

Sequential Steps for MLM using APIM	SAS v9.2 Procedure Code

1. Determine within-dyad interdependence	proc freq data = bfsapim;
	where id = 0;
	table aDV*pDV / measures cl;
	run;

2. Generate selected model parameters
a. Random intercepts' variance estimate for between-cluster variance
b. Starting values for coefficient estimates (intercept and slope parameters)
	proc mixed method = reml;
	class dyad;
	model aDV = aX pX aZ pZ /solution;
	random intercept /subject = dyad type = un;
	run;
	
	proc genmod descending;
	class ndyad;
	model aDV = aX pX aZ pZ …/dist = bin link = logit;
	repeated subject = ndyad / type = un;
	run;

3. Evaluate conditional random intercepts model	proc nlmixed qpoints = 20 tech = newrap;
	parms beta0 = __ beta1 = __ beta2 = __ beta3 = __ s2u = __;
	eta = beta0 + beta1*__ + beta2*__ + beta3*__ + u;
	mu = exp(eta) / (1 + exp (eta));
	model aDV ~ binary (mu);
	random u ~ normal(0,s2u) subject = ndyad;
	run;

CHAPTER 4: RESULTS

In this chapter I report the study results. The first section presents descriptive statistics on demographics, relationship characteristics, and sexual risk behaviors of the study sample. The next section provides results for each research hypothesis.

Description of the Sample

Demographics

Data were collected from 144 gay male couples in Portland, Oregon and Seattle, Washington. The sample was recruited almost equally between the two cities: 53% and 47%, respectively. Two couples were ineligible to participate in the study due to one member having identified as HIV positive and another having identified his gender as male-to-female. Partners of the ineligible participants were also excluded from analysis. The final sample used for the present study analyses included 142 gay male couples.

Descriptive statistics of demographics appear in Table 3. The majority of men self identified as gay (95%) and lived in an urban/city environment (82%). With regard to their ethnicity, 92% identified as non-Hispanic while 8% identified as Hispanic. Among the sample of men, 241 were Caucasian (85%), 15 identified as mixed, 10 as other, 8 were Asian, 6 as Pacific Islander, and 2 for both African American and American Indian. Overall, the sample was well educated with nearly two-thirds of the men having received at least a bachelor's degree. For employment status, 15% of the men were unemployed while 85% were employed. About 80% of the men earned more than $30,000 per year.

Table 3. Descriptive Statistics for Demographics (N = 284 MSM)

Demographics	Percent	Frequency
Age, *Mean* (SD)	34.1 (8.4)	284
Ethnicity		
Non-Hispanic	92%	262
Hispanic	8%	22
Race		
Caucasian	85%	241
Mixed	5%	15
Other	4%	10
Asian	3%	8
Pacific Islander	2%	6
African American	1%	2
American Indian	1%	2
Highest education level		
Less than Bachelors degree	32%	91
Bachelors degree or higher	68%	193
Employment status		
Unemployed	15%	41
Employed	85%	243
Personal income		
None	3%	9
< $30,000	18%	51
$30,001-$60,000	34%	95
>$60,001	45%	129
Location of home		
Urban/City	82%	234
Suburbs/Rural	18%	50
City recruited		
Portland, OR	53%	151
Seattle, WA	47%	133
Sexual identity		
Gay/Homosexual	95%	271
Queer	3%	8
Bisexual	2%	5

Relationship Characteristics

Descriptive statistics of relationship characteristics appear in Table 4. Most men lived with their main sexual partner (82%). Among those men who lived with their main sexual partner, 65% of them had done so for more than 12 months. Over half of the men have been in their sexual relationship for less than five years (58%). Approximately half of the men were in a strictly monogamous relationship (51%) and the rest of the men indicated they were in an open relationship of some type.

The sample was divided into three groups regarding sexual agreements. Thirty-four percent of the sample (N=97) reported not having a sexual agreement with their main sexual partner, which included both men in 24 couples (N=48) and 49 other men. The remaining 66% of the sample (N=187) reported they had a sexual agreement with their main sexual partner and consisted of two categories: 1) couples with both men reporting they had a sexual agreement (N=136, 68 dyads) and 2) couples with only one male reporting he had a sexual agreement (N=50).

Forty-seven percent of men who had a sexual agreement with their main sexual partner had a "we only have sex with one another" type of agreement. The remaining 53% of men with sexual agreements had a non-exclusive type of sexual agreement. Among the 187 men who made a sexual agreement with their main sexual partner, 77% stated their sexual agreement was discussed in detail (explicit) while the remaining 23% indicated their sexual agreement was more implied and not discussed in detail. The majority of men who made a sexual agreement with their main sexual

partner also reported that they and their partner understood their sexual agreement (92% and 90% respectively).

Twenty percent of men broke their sexual agreement and 9% were unsure if they did break it. Among the men who either broke or were unsure of breaking their sexual agreement, 43% reported they told their partner about the break. The men also reported ten percent of their partners broke their sexual agreement and another 15% were unsure if their partners had kept their agreement.

Among the 97 men who did not have a sexual agreement, 31% wanted a sexual agreement with their main partner, 32% were unsure, and 37% did not. When asked if their partner wanted a sexual agreement, 23% reported yes, 40% were unsure, and 37% said no.

Table 4. Descriptive Statistics for Relationship Variables (N = 284 MSM, 142 dyads)

Relationship Variables	Percent	Frequency
Live together		
Yes	82%	234
No	18%	50
Duration of living together		
Do not live together	15%	44
< 6 months	10%	29
6-12 months	9%	26
> 12 months	65%	185
Relationship duration		
< 5 years	58%	165
> 5 years	42%	118
Type of relationship		
Strictly monogamous	51%	144
Monogamous, but have threesomes, etc.	25%	71
Open with restrictions	21%	60
Open without restrictions	3%	9
Made sexual agreement		
Yes	66%	187
No	34%	97
Type of SA		
Only sex with each other	47%	87
Sex together while with others	44%	81
Sex together and only he can with others	<1%	1
Sex with whomever whenever	9%	17
Understands SA / Perceives partner understands SA		
Yes	92% / 90%	172 / 167
Not sure	4% / 7%	7 / 13
No	4% / 4%	8 / 7
Broke SA with main sex partner		
Yes	20%	38
Not sure	9%	16
No	71%	133
Told main sexual partner about SA break		
Yes	43%	18
No	57%	24
Partner kept SA		
Yes	75%	141
Not sure	15%	28
No	10%	18

Table 4 (continued). Descriptive Statistics for Relationship Variables
(N = 284 MSM, 142 dyads)

Relationship Variables	Percent	Frequency
Concordance on having sexual agreement (SA)		
Both said yes	48%	68 dyads
Both said no	17%	24 dyads
Discordance	35%	50 dyads
Concordance on understanding SA (N=68 dyads)		
Both said yes	81%	55 dyads
Both said no or not sure	3%	2 dyads
Discordance	16%	11 dyads
Wants SA / Perceives partner wants SA		
Yes	31% / 23%	32 / 23
Not sure	32% / 40%	33 / 39
No	37% / 37%	37 / 37

Sexual Risk Behaviors

Descriptive statistics of sexual risk behaviors appear in Table 5. Regarding sexual risk behaviors, 90% of the men reported UAI within the past three months with their main sexual partner. Among the 257 men that had UAI with their main sexual partner, 58% had both receptive and insertive anal intercourse, 18% had receptive anal intercourse, and 25% had insertive anal intercourse. Ten percent (28) of the sample also indicated having UAI within the past three months with someone other than their main sexual partner. Among these 28 men, 9 had both receptive and insertive anal intercourse, 6 had receptive anal intercourse, and 13 had insertive anal intercourse.

The majority of the men reported as HIV negative (95%) and 5% were uncertain about their serostatus. Regarding their last HIV test, half of the men reported that it happened less than 6 months ago and 49% indicated their test occurred more than 6 months ago. Four individuals had never been tested for HIV. When the men were asked about their main sexual partner's HIV serostatus, 93% stated their main partner was HIV negative and 7% were uncertain about their main partner's HIV serostatus. Men also reported on when their main sexual partner's last HIV test had occurred: 40% reported within the past 6 months, 58% stated more than 6 months ago, and 5 men indicated their main sexual partner had never been tested for HIV. The next section presents results related to each specific hypothesis.

Table 5. Descriptive Statistics for Sexual Risk Behaviors (N = 284 MSM)

Sexual Risk Behaviors	Percent	Frequency
UAI with main sex partner (< 3 months)		
Yes	90%	257
No	10%	27
Sexual role with main sex partner (< 3 months)		
Bottom/Receptive	18%	45
Top/Insertive	25%	63
Both/Versatile	58%	149
UAI with someone else (< 3 months)		
Yes	10%	28
No	90%	256
Sexual role with someone else (< 3 months)		
Bottom/Receptive	22%	6
Top/Insertive	46%	13
Both/Versatile	32%	9
Self reported HIV serostatus		
Negative	95%	270
Unknown/ Not sure	5%	14
Self reported last HIV test		
< 6 months	50%	142
> 6 months	49%	138
never been tested before	1%	4
Main sex partner's HIV serostatus		
Negative	93%	264
Unknown/ Not sure	7%	20
Main partner's last HIV test		
< 6 months	40%	113
> 6 months	58%	163
never been tested before	2%	5

Results for Research Hypotheses

Hypotheses 1a and 1b

Figure 1 illustrates which couples made their sexual agreement to be monogamous and the extent to which partners had concurred and kept their monogamous agreement. Of the 142 couples, 68 couples explicitly made a sexual agreement. Twenty-six of these 68 couples chose to be monogamous. Among the 26 monogamous couples, 17 couples (65%) kept their agreement and eight couples (31%) reported a one-sided break in their agreement. One couple (4%) reported a mutual break; neither partner had kept their agreement.

Hypothesis 1a, *Gay male couples will make sexual agreements to be monogamous,* was not supported because only 26 out of 142 gay male couples reported their sexual agreement to be monogamous; this finding was significantly less than 50% of the sample, $p<.001$. Hypothesis 1b, *the majority of partners among gay male couples will concur and have kept their sexual agreement to be monogamous*, was also not supported. Although 65% of monogamous couples had kept their agreement to be monogamous, this finding was not found to be statistically significant from a one-sample test of a proportion with a one-tailed alternative hypothesis.

Figure 1.
Concordance on Sexual Agreement for
Monogamy and Agreement Breaks
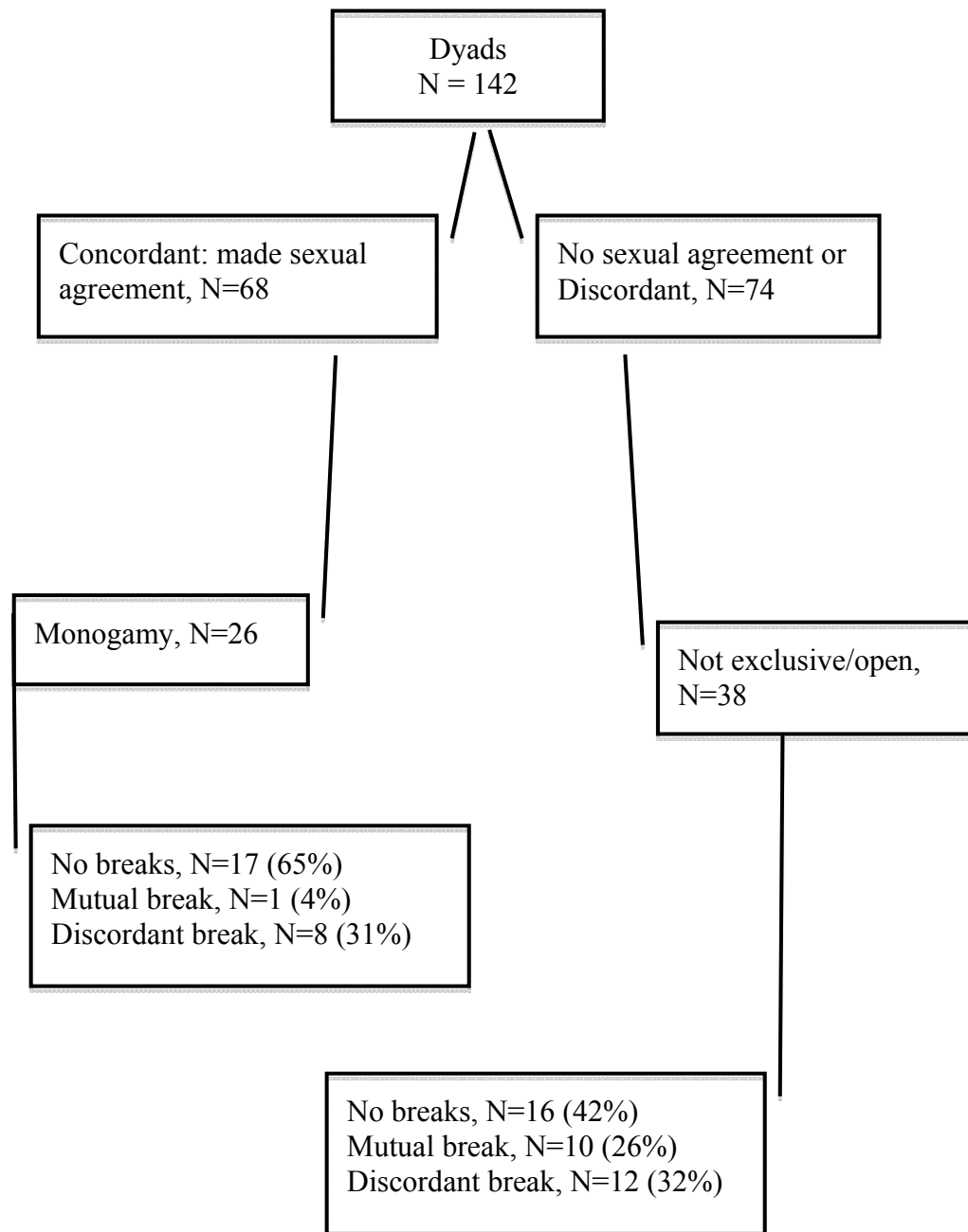
Hypothesis 2a

The second hypothesis, *Dyad-level characteristics and relationship dynamics will be associated with high HIV risk,* was examined using the following analyses. Selected bivariate dyad-level characteristics of high HIV risk and low HIV risk gay male couples are presented in Table 6. Compared to couples who had low HIV risk, couples who had high HIV risk were significantly less employed, perceived their partner to be less predictable for trust, were less satisfied with their relationship, perceived more alternatives to their current relationship, had a less positive attitude toward using condoms with other partners, perceived themselves as less able to use condoms with their partner in the future, and valued their sexual agreement less. The two groups did not statistically differ on the other independent variables.

Results from the multiple logistic regression analysis are presented in Table 7. The factors included were those identified in bivariate analysis as having a significant association with high HIV risk (p<.05). Value of sexual agreement was excluded as a predictor because so few couples responded to this measure and the sample size for the model would have been significantly smaller. Perceiving more quality of alternatives to the relationship was significantly associated with high HIV risk (OR = 2.55, p< 05). The odds of having high HIV risk was negatively and strongly associated with being employed (OR = 0.14, p<.001); couples with both men employed were less likely to have high HIV risk compared to couples with one or both men were unemployed. The hypothesis, *Dyad-level characteristics and relationship dynamics*

will be associated with high HIV risk, was partially supported by these findings

because only two predictors were statistically significant.

Table 6. Bivariate Results: Comparisons Between High HIV Risk Couples and Low HIV Risk Couples on Dyad-Level Characteristics

Characteristics	High HIV Risk (n=28)	Low HIV Risk (n=114)	Total (n=142)
Mean age, (SD)	35.9 (9.1)	33.7 (7.1)	34.1 (7.6)
Employment, n (%)**			
Both unemployed	3 (11%)	2 (2%)	5 (4%)
Both employed	14 (50%)	92 (81%)	106 (75%)
Mixed	11 (39%)	20 (17%)	31 (22%)
Cohabitate, n (%)			
Live together	23 (82%)	92 (81%)	115 (81%)
Do not live together	5 (18%)	22 (19%)	27 (19%)
Relationship duration, n (%)			
< 5 years	15 (54%)	67 (59%)	82 (58%)
> 5 years	13 (46%)	47 (41%)	60 (42%)
Sexual Agreement, n (%)			
Concordant	15 (54%)	53 (46%)	68 (48%)
Discordant	13 (46%)	61 (54%)	74 (52%)
Trust Scale [range: -3 – 3]			
Predictability, mean (SD)*	0.98 (.98)	1.46 (0.87)	1.36 (0.91)
Dependable, mean (SD)	1.22 (0.92)	1.39 (0.84)	1.36 (0.86)
Faith, mean (SD)	1.78 (0.77)	1.95 (0.75)	1.91 (0.76)
IM Scale [range: 1 – 6]			
Relationship Commitment, mean (SD)	5.20 (0.78)	5.45 (0.59)	5.40 (0.64)
Relationship Satisfaction, mean (SD)*	4.45 (0.81)	4.87 (0.81)	4.79 (0.82)
Investment Size, mean (SD)	4.59 (0.97)	4.68 (0.62)	4.66 (0.70)
Quality of Alternatives, mean (SD)**	3.05 (0.17)	2.51 (0.08)	2.62 (0.07)

p-values of * <.05, **<.01, and ***<.001 were for tests of significance with the Pearson chi-squared test and Fisher's exact test for categorical variables and the independent t-test for continuous variables. For highly skewed variables (attitude, intention, and perceived behavioral control toward future condom use with other sexual partners), the Mann-Whitney rank-sum test was used when skewness was greater than three in either direction.

Table 6 (continued). Bivariate Results: Comparisons Between High HIV Risk Couples and Low HIV Risk Couples on Dyad-Level Characteristics

Characteristics	High HIV Risk (n=28)	Low HIV Risk (n=114)	Total (n=142)
TPB: future condom use [range: 1 – 7]			
Attitude – main partner, mean (SD)	2.41 (1.49)	2.32 (1.57)	2.34 (1.55)
Attitude – other partners, mean (SD)***	6.59 (0.56)	6.87 (0.50)	6.82 (0.52)
Intention – main partner, mean (SD)	2.30 (1.57)	2.28 (1.69)	2.29 (1.66)
Intention – other partners, mean (SD)	6.54 (0.73)	6.56 (0.94)	6.56 (0.90)
Perceived Behavioral Control – main partner, mean (SD)*	4.70 (2.01)	5.49 (1.61)	5.33 (1.72)
Perceived Behavioral Control – other partners, mean (SD)	6.84 (0.31)	6.77 (0.66)	6.79 (0.61)
Sexual Agreement Investment Scale [range: 0 – 4]	(n = 15)	(n = 53)	(n = 68)
Commitment, mean (SD)	3.30 (0.71)	3.54 (0.42)	3.49 (0.50)
Satisfaction, mean (SD)	2.91 (0.69)	3.12 (0.53)	3.08 (0.57)
Value, mean (SD)*	3.09 (0.70)	3.49 (0.46)	3.40 (0.54)

p-values of * <.05, **<.01, and ***<.001 were for tests of significance with the Pearson chi-squared test and Fisher's exact test for categorical variables and the independent t-test for continuous variables. For highly skewed variables (attitude, intention, and perceived behavioral control toward future condom use with other sexual partners), the Mann-Whitney rank-sum test was used when skewness was greater than three in either direction.

Table 7. Odds Ratios and 95% Confidence Intervals from Logistic Regression Analysis of High HIV Risk Couples (vs. Low HIV Risk Couples) by Dyad-level Characteristic

Characteristics	Odds Ratio	95 % C.I.
Age in years	1.06	0.99 – 1.14
Employment (both employed vs. other)***	0.14	0.05 – 0.41
IM Scale		
Quality of Alternatives*	2.55	1.22 – 5.33
Satisfaction Level	1.04	0.50 – 2.17
Trust Scale		
Predictability	0.69	0.41 – 1.16
TPB: condom use		
Attitude about future condom use with other partners	0.51	0.25 – 1.04
Perceived ability on future condom use with main partner	0.78	0.57 – 1.05
Model n	141	
Pseudo R^2 (LR χ^2 p-value)	0.24 (<.001)	

p-values of * <.05, **<.01, and ***<.001

Hypothesis 2b

The additional second hypothesis, *Dyad-level characteristics and relationship dynamics will be associated with having UAI with a non-main partner,* was examined using the same methodology as the previous hypothesis. Selected dyad-level characteristics of couples who had UAI with a non-main partner versus couples who did not have UAI with other partners are presented in Table 8. Compared to couples who did not have UAI with a non-main partner, couples who had UAI with an outside partner were significantly older, less employed, perceived their partner to be less predictable for trust, were less satisfied with their relationship, perceived more alternatives to their current relationship, had a less positive attitude about using condoms in the future with other partners, perceived themselves as less able to use condoms in the future with their main partner, were less committed to their sexual agreement, and valued their sexual agreement less. The groups did not statistically differ on the other independent variables.

Results from the multiple logistic regression analysis are presented in Table 9. The factors included were those identified in bivariate analysis as having a significant association with having UAI with other partners. Value and commitment of sexual agreement were excluded as predictors because so few couples responded to this measure and the sample size for the model would have been significantly smaller**.** Perceiving more quality of alternatives to the relationship and being older were significantly associated with having UAI with other partners (OR = 2.88, p< 05 and OR = 1.15, p<.01). The odds of having UAI with other partners was negatively and

strongly associated with being employed (OR = 0.11, p<.01); couples with both men

employed were less likely to have UAI with other partners compared to couples with

one or both men were unemployed. In addition, the odds of having UAI with other

partners was negatively associated with attitude about future condom use with other

partners (OR = 0.38, p<.05); couples who have UAI with other partners were less

likely to have a more positive attitude about using condoms with other partners in the

future compared to couples who did not have UAI with other partners. The hypothesis,

Dyad-level characteristics and relationship dynamics will be associated with having

UAI with a non-main partner, was supported by these findings.

Table 8. Bivariate Results: Comparisons Between Couples Who Had UAI with Other Partners and Those Who Did Not on Dyad-level Characteristics

Characteristics	UAI with Non-main Partner (n=22)	None (n=120)	Total (n=142)
Mean age, (SD)**	38.3 (8.0)	33.4 (7.3)	34.1 (7.6)
Employment, n (%)*			
Both unemployed	1 (5%)	4 (3%)	5 (4%)
Both employed	11 (50%)	95 (79%)	106 (75%)
Mixed	10 (45%)	21 (18%)	31 (22%)
Cohabitate, n (%)			
Live together	18 (82%)	97 (81%)	115 (81%)
Do not live together	4 (18%)	23 (19%)	27 (19%)
Relationship duration, n (%)			
< 5 years	9 (41%)	73 (61%)	82 (58%)
> 5 years	13 (59%)	47 (39%)	60 (42%)
Sexual Agreement, n (%)			
Concordant	13 (59%)	55 (46%)	68 (48%)
Discordant	9 (41%)	65 (54%)	74 (52%)
Trust Scale [range: -3 – 3]			
Predictability, mean (SD)*	0.95 (0.99)	1.44 (0.87)	1.36 (0.91)
Dependable, mean (SD)	1.05 (1.02)	1.41 (0.81)	1.36 (0.86)
Faith, mean (SD)	1.65 (0.79)	1.96 (0.74)	1.91 (0.76)
IM Scale [range: 1 – 6]			
Relationship Commitment, mean (SD)	5.21 (0.76)	5.44 (0.61)	5.40 (0.64)
Relationship Satisfaction, mean (SD)*	4.45 (0.79)	4.85 (0.81)	4.79 (0.82)
Investment Size, mean (SD)	4.47 (0.99)	4.70 (0.63)	4.66 (0.70)
Quality of Alternatives, mean (SD)**	3.08 (0.86)	2.53 (0.84)	2.62 (0.86)

p-values of * <.05, **<.01, and ***<.001 were for tests of significance with the Pearson chi-squared test and Fisher's exact test for categorical variables and the independent t-test for continuous variables. For highly skewed variables (attitude, intention, and perceived behavioral control toward future condom use with other sexual partners), the Mann-Whitney rank-sum test was used when skewness was greater than three in either direction.

Table 8 (continued). Bivariate Results: Comparisons Between Couples Who Had UAI with Other Partners and Those Who Did Not on Dyad-level Characteristics

Characteristics	UAI with Non-main Partner (n=22)	None (n=120)	Total (n=142)
TPB: future condom use [range: 1 – 7]			
Attitude – main partner, mean (SD)	2.57 (1.79)	2.30 (1.50)	2.34 (1.55)
Attitude – other partners, mean (SD)***	6.45 (0.57)	6.88 (0.49)	6.82 (0.52)
Intention – main partner, mean (SD)	2.41 (1.69)	2.26 (1.66)	2.29 (1.66)
Intention – other partners, mean (SD)	6.57 (0.54)	6.55 (0.95)	6.56 (0.90)
Perceived Behavioral Control – main partner, mean (SD)*	4.52 (1.96)	5.48 (1.63)	5.33 (1.72)
Perceived Behavioral Control – other partners, mean (SD)	6.89 (0.26)	6.77 (0.65)	6.79 (0.61)
Sexual Agreement Investment Scale [range: 0 – 4]	**(n = 13)**	**(n = 55)**	**(n = 68)**
Commitment, mean (SD)*	3.18 (0.70)	3.56 (0.42)	3.49 (0.50)
Satisfaction, mean (SD)	2.85 (0.68)	3.13 (0.54)	3.08 (0.57)
Value, mean (SD)***	2.94 (0.65)	3.51 (0.46)	3.40 (0.54)

p-values of * <.05, **<.01, and ***<.001 were for tests of significance with the Pearson chi-squared test and Fisher's exact test for categorical variables and the independent t-test for continuous variables. For highly skewed variables (attitude, intention, and perceived behavioral control toward future condom use with other sexual partners), the Mann-Whitney rank-sum test was used when skewness was greater than three in either direction.

Table 9. Odds Ratios and 95% Confidence Intervals from Logistic Regression Analysis of Couples who Had UAI with Other Partners (vs. Couples who did not) by Dyad-level Characteristic

Characteristics	Odds Ratio	95 % C.I.
Age in years**	1.15	1.06 – 1.26
Employment (both employed vs. other)**	0.11	0.03 – 0.40
IM Scale		
Quality of Alternatives*	2.88	1.18 – 7.06
Satisfaction Level	1.24	0.50 – 3.09
Trust Scale		
Predictability	0.70	0.36 – 1.38
TPB: condom use		
Attitude about future condom use with other partners*	0.38	0.17 – 0.88
Perceived ability on future condom use with main partner	0.80	0.57 – 1.12
Model n	141	
Pseudo R^2 (LR χ^2 p-value)	0.34 (<.001)	

p-values of * <.05, **<.01, and ***<.001

Hypothesis 3

The third hypothesis, *Dyad-level characteristics and relationship dynamics will be associated with the sexual agreement to be monogamous* was assessed with the following analyses. Selected bivariate dyad-level characteristics of couples who had a sexual agreement to be monogamous and couples who had a sexual agreement that was non-monogamous are presented in Table 10. Compared to couples who did not have a sexual agreement to be monogamous, couples who had a sexual agreement to be monogamous significantly perceived their partner to be more predictable for trust, had less investment regarding their relationship, were more committed to their sexual agreement, valued their sexual agreement more, and had been in their relationship for five years or less. The groups did not statistically differ on the other independent variables.

Results from the multiple logistic regression analysis are presented in Table 11. The factors included were those identified in bivariate analysis as having a significant association with having made a sexual agreement to be monogamous. Value of sexual agreement was excluded in the final model because of issues with multicollinearity; it was highly correlated with commitment to sexual agreement (0.84). Being in a relationship of five years or less and having a higher commitment to their sexual agreement were significantly associated with having a sexual agreement to be monogamous (OR = 5.28, p< .05 and OR = 5.49, p<.05, respectively). The hypothesis, *Dyad-level characteristics and relationship dynamics will be associated*

with the sexual agreement to be monogamous, was partially supported by these findings because only two predictors were statistically significant.

Table 10. Bivariate Results: Comparisons Between Couples' Sexual Agreement Type on Dyad-level Characteristics

Characteristics	Monogamous Agreement (n = 26)	Non-monogamous Agreement (n = 38)	Total (n = 64)
Mean age, (SD)	33.2 (8.8)	37.2 (8.6)	35.6 (8.8)
[range]	[18.5 – 54]	[23 – 57]	[18.5 – 57]
Relationship duration, n (%)**			
< 5 years	20 (77%)	14 (37%)	34 (53%)
> 5 years	6 (23%)	24 (63%)	30 (47%)
UAI with main partner			
Yes	23 (88%)	33 (87%)	56 (88%)
No	3 (12%)	5 (13%)	8 (12%)
Understand Agreement			
Yes	24 (92%)	29 (76%)	53 (83%)
No	2 (8%)	9 (24%)	11 (17%)
Trust Scale [range: -3 – 3]			
Predictability, mean (SD)*	1.70 (0.89)	1.19 (0.94)	1.40 (0.95)
Dependable, mean (SD)	1.56 (0.73)	1.38 (0.96)	1.45 (0.87)
Faith, mean (SD)	2.19 (0.58)	1.93 (0.72)	2.04 (0.67)
IM Scale [range: 1 – 6]			
Relationship Commitment, mean (SD)	5.39 (0.61)	5.53 (0.52)	5.48 (0.56)
Relationship Satisfaction, mean (SD)	5.01 (0.70)	4.92 (0.80)	4.95 (0.75)
Investment Size, mean (SD)*	4.56 (0.82)	4.90 (0.41)	4.76 (0.08)
Quality of Alternatives, mean (SD)	3.65 (0.89)	3.40 (0.70)	3.50 (0.79)
Sexual Agreement Investment Scale [range: 0 – 4]			
Commitment, mean (SD)**	3.68 (0.37)	3.34 (0.55)	3.48 (0.51)
Satisfaction, mean (SD)	3.22 (0.51)	2.95 (0.60)	3.06 (0.58)
Value, mean (SD)*	3.61 (0.44)	3.25 (0.59)	3.40 (0.56)

p-values of * <.05, **<.01, and ***<.001 were for tests of significance with the Pearson chi-squared test and Fisher's exact test for categorical variables and the independent t-test for continuous variables.

Table 11. Odds Ratios and 95% Confidence Intervals from Logistic Regression Analysis of Couples Sexual Agreement to be Monogamous (vs. Other) by Dyad-level Characteristic

Characteristics	Odds Ratio	95 % C.I.
Relationship Duration of 5 years or less*	5.28	1.30 – 21.46
IM Scale		
Investment Size	0.42	0.13 – 1.34
Trust Scale		
Predictability	2.06	0.89 – 4.77
Sexual Agreement Investment Scale		
Commitment*	5.49	1.09 – 27.68
Model n	64	
Pseudo R^2 (LR χ^2 p-value)	0.27 (<.001)	

*p*-values of * <.05, **<.01, and ***<.001

Hypothesis 4

The Actor-Partner Interdependence Model (APIM) was used to assess whether an individual's reported perceived trust level, relationship commitment, investment in sexual agreement, protective sexual behaviors were influenced by his partner's reported perceived trust level, relationship commitment, investment in sexual agreement, risky sexual behaviors. Scores for all individual-level predictors were mean-centered. To determine whether a multilevel approach was appropriate for assessing actor-partner effects, within-dyad interdependence was first calculated by using the PROC FREQ procedure in SAS; an intraclass correlation coefficient was produced with a 95% confidence level. The PROC MIXED and GENMOD procedures were then used to generate estimates for the conditional random intercepts model. Finally, NLMIXED procedure was used to generate estimates for actor and partner effects on reported perceived trust level, relationship commitment, planned condom use, and investment in sexual agreement for predicting HIV risk.

Several models were examined for significant actor-partner effects. For example, four models were created to assess relationship commitment-related effects; three models for trust-related effects; three models for investment in sexual agreement effects; two models for attitude about future condom use, two models for intentions on future condom use; and two models for perceived behavioral control on future condom use. Figure 2 illustrates the APIM pathway with parallel lines representing actor effects, diagonal lines representing partner effects, X1 and Y1 as actor's predictor and

outcome scores, and X2 and Y2 as partner's predictor and outcome scores. Results

obtained for each of the models are presented next.

Figure 2. APIM framework
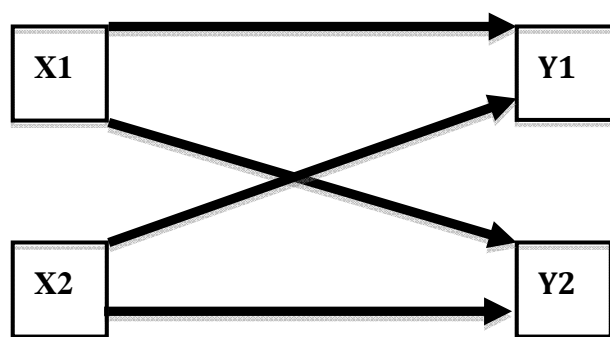
APIM for trust. Actor and partner effects for perceived trust were estimated

to predict high HIV risk among gay male couples. A different model was created for

each subscale of Trust: predictability, dependability, and faith. In each model, the

independent variables were the actor and partner mean centered scores of the specific

trust measure and the dependent variable was a dichotomous outcome measure for

HIV risk level (1 high, 0 low). Only the actor effect for predictability of trust was

statistically significant for predicting high HIV risk among the couples (adjusted OR =

0.95, p<.05). Holding the partner effect constant, the significant actor effect indicated

that for each one point increase in the actor's score of predictability, the odds of that

couple being high HIV risk decrease by a factor of 0.95. In other words, for each one-

point increase in the actor's score for his perceived predictability of trusting his

partner, the odds of that couple being high HIV risk decrease by 5%. No other actor or partner effects for trust were found to be statistically significant for predicting high HIV risk.

APIM for commitment. Actor and partner effects were assessed for relationship commitment on HIV risk. Four models on relationship commitment were examined to account for the components within the Investment Model including commitment, satisfaction, investment size, and quality of alternatives. In each model, the independent variables were the actor and partner mean centered scores of the specific commitment measure and the dependent variable was the dichotomous outcome measure for HIV risk level (1 high, 0 low). Two actor effects from these models were detected to be statistically significant for predicting high HIV risk among the couples: commitment to the relationship and quality of alternatives.

Holding the partner effect constant for relationship commitment, for each one point increase in the actor's score of commitment to his relationship, the odds of that couple being high HIV risk decrease by about 0.50 or 50% (adjusted OR = 0.50, p<.05). Holding the partner effect constant for quality of alternatives to the relationship, for each one point increase in the actor's score of quality of alternatives to his relationship, the odds of that couple being high HIV risk increase by about 1.79 or 79% (adjusted OR = 1.79, p<.05). The more the actor perceives that his quality of alternatives for other potential partners or relationships increases, the more likely that couple has a high risk for contracting HIV. No other actor or partner effects of the

measures for the Investment Model were found to be statistically significant for predicting high HIV risk.

APIM for TPB constructs: Condom use. Actor and partner effects were assessed for the Theory of Planned Behavior (TPB) constructs of attitude, intention, and perceived behavioral control for future condom use on HIV risk. Six models were examined in total. For each construct, two models were created; one model was used to examine future condom use with main partner and the other model was needed to examine future condom use with other sex partners. Every model included the actor and partner mean centered scores for that one particular construct and HIV risk level score as the dichotomous outcome score. Only the actor effect for perceived behavioral control regarding future condom use with main partner was statistically significant for predicting high HIV risk among the couples (adjusted OR = 0.71, $p<0.05$). Holding the partner effect constant, this significant actor effect indicated that for each one point increase in his score on perceived ability to use condoms in the future with his partner, the odds of that couple being high HIV risk decrease by about 0.71 or 29%. No other actor or partner effects of the measures for the Theory of Planned Behavior constructs regarding future condom use were found to be statistically significant for predicting high HIV risk.

APIM for Investment in Sexual Agreement. Actor and partner effects were assessed for investment in sexual agreement on HIV risk. Three models on investment in sexual agreement were examined to account for the different components within the scale including, commitment, satisfaction, and value. In each model, the independent

variables were the actor and partner mean centered scores for the specific investment in sexual agreement component and the dependent variable was the dichotomous outcome measure for HIV risk level (1 high, 0 low). The actor effect for value of investment in sexual agreement was found to be statistically significant (adjusted OR = 0.06, p<0.05). Holding the partner effect constant, this significant actor effect indicated that for each one-point increase in his score on value of his sexual agreement, the odds of that couple being high HIV risk decrease by about 0.06 or 94%. All other actor and partner effects for investment in sexual agreement were not significant for predicting high HIV risk.

Summary of Actor-Partner Effects

In conclusion, actor and partner estimates for perceived trust, relationship commitment, planned condom use, and investment in sexual agreement were generated to predict HIV risk among gay male couples. Few actor effects were statistically significant for predicting HIV risk. Actor effects for predictability for trust in partner, commitment to the relationship, perceived ability to use condoms with the main partner in the future, and value of sexual agreement significantly predicted the odds of gay male couples being high HIV risk were lower with every one point increase on each of these factors. An actor effect for quality of alternatives to the relationship also significantly predicted the odds of gay male couples being high HIV risk were higher with every point increase in this factor. None of the Actor-Partner Interdependence models for perceived trust, relationship commitment, planned condom use, and investment in sexual agreement produced significant partner effects

for predicting high HIV risk. As such, the hypothesis that actor outcome measures will be positively associated with partner outcome measures was not supported. Further research among gay male couples is needed to better understand how certain actor-partner effects may either predict high HIV risk or provide protective effects from HIV acquisition.

CHAPTER 5. DISCUSSION

Findings from the study are interpreted and discussed first. Limitations of the study are next addressed followed by implications for Public Health and then suggestions for future research. Lastly, a conclusion of the study is given.

Findings from the Study

More gay men are contracting HIV from their main sexual partners than from their causal sexual partners (Sullivan et al., 2009). Findings from this study help provide insight into this current public health issue with several important themes being identified. Each theme will be discussed including, few reported sexual agreements to be monogamous, perception that a better sexual partner exists, employment provides protection, and risk rationalization.

Few Reported Sexual Agreements to be Monogamous

Of the 142 gay male couples who participated in this study, less than half had established a sexual agreement (68/142) and far fewer of these couples had chosen monogamy for their sexual agreement. In contrast, half of the gay couples in the study identified as being in a monogamous relationship, yet, did not indicate that they had a sexual agreement of monogamy. Other studies with gay male couples reported a higher percentage of sexual agreements to be monogamous than the present study (18% vs. 21%-48%, respectively) (Appleby et al., 1999; Hoff & Beougher, 2008; Hoff et al., 2009; LaSala, 2004a; 2004b; Wagner et al., 2000).

It is important to note how the present study differed from previous studies with gay male couples. In detail, the present study was the first to collect dyadic data among gay male couples from Portland, Oregon and Seattle, Washington and

exclusively examined relationship factors on sexual risk behaviors among HIV

negative seroconcordant couples. The present study also obtained the second largest

sample size of gay male couples in the United States, second to the study conducted in

San Francisco by Hoff et al. (2009). Given these differences, several explanations may

be plausible as to why so few gay male couples in the present study had a sexual

agreement, let alone one to be monogamous.

First, some gay men may be uncomfortable discussing sex and would rather

avoid talking about this topic with their main partner. The discomfort of talking about

sex may stem from being afraid to voice what they really want sexually, either out of

fear of rejection or as an attempt to avoid conflict with their main sexual partner.

These men may also believe that their partners would be unsupportive of their desire

for different or additional sexual expression. As a result, gay men in relationships may

purposely reframe from talking to their partners about sex in regards to their

expectations, desires, and understanding of their current sexual relationship. For

example, other studies have reported gay men's poor sexual communication skills and

discomfort in talking about certain aspects of sex with their partners (Crawford et al.,

1999; Hays, Kegeles, & Coates, 1997; LaSala, 2004a; Prestage et al., 2006; Remien et

al., 1995). The discomfort to communicate about sex could prohibit gay men the

opportunity to establish a sexual agreement with their main partner.

Second, the belief that sexual agreements are associated with couples that are

open, promiscuous, or non-traditional may exist. Men who do not relate to either of

these characteristics may not identify with the term sexual agreement. In addition, they

may also think that it is unnecessary or unimportant to have an established sexual agreement of monogamy, especially if they view their "contract" as so simple; we are only together with each other – what is there to discuss? This perception that monogamy is too simple to warrant an established sexual agreement leaves room for assumptions, personal interpretations, and misguidance; findings from three previous studies with gay male couples supported this claim (Hoff & Beougher, 2008; LaSala, 2004a; Worth et al., 2002). The assumption that sexual agreements are only for "open" couples or that monogamy is too simple, opens the possibility for men to interpret their own meaning of monogamy; unbeknownst to their partners, men could then engage in sexual risk behaviors outside of their relationship and as a result, put their partners at risk for HIV.

Third, the culture within the gay male community in the Pacific Northwest may not be conducive for gay male couples to make a sexual agreement, let alone one of monogamy. For example, sexual freedom, promiscuity, and a less positive attitude toward having a more traditional type of relationship (e.g. monogamy) may be components of the current culture that are valued among gay men in Portland, Oregon and Seattle, Washington. Additionally, societal views and state laws prohibit same-sex couples the ability to marry. This inequality that same-sex couples experience may inadvertently reinforce gay men to have more nontraditional sexual relationships other than monogamy. For example, Lannutti (2007) reported that legally recognized same-sex marriage impacted LGBT individuals' understanding of romantic relationships by making existing relationships seem more real. Therefore, the overall culture within the

Pacific Northwest, including the gay male communities, may then have an affect on the types and quality of sexual relationships that gay men choose to have with their main partners. Consequently, sexual agreements among gay male couples may not be widely accepted, encouraged, or recognized as an important component to having a healthy sexual relationship.

Perception that a Better Sexual Partner Exists

Some men perceived that a better sexual partner existed for them; this finding was significantly associated with having had UAI with a non-main partner and being at higher risk for HIV. The finding was consistent with the Investment Model, which posits that if a person perceives someone other than his main partner to be superior to his current partner, then he would be more likely to engage in sex outside his relationship.

The investment model (Rusbult, 1980; 1983) has been used in previous studies to predict sexual risk behaviors among steady partners, including gay men (Buunk & Bakker, 1997; Davidovish et al., 2006; de Vroome et al., 2000). Davidovich et al. found that lower relationship satisfaction and higher relationship investment were associated with risky UAI among gay men and their main sexual partners (2006) whereas de Vroome et al. found that higher satisfaction and fewer alternatives to the relationship predicted safer sex with non-main partners among gay male couples (2000). In contrast to de Vroome et al. (2000), the present study found that gay male couples who reported more alternatives were more likely to have had UAI with a non-

main partner. This study was the first to report such a finding. Plausible explanations for this finding are discussed next.

Gay men in some of the couples may have believed that their current partner was not the "one" and their relationship was not permanent. If these men did not believe their current relationship was going to last forever, then conceivably, they may care less about their current partner. By thinking their relationship was not permanent and caring less about their current partner, they may then try to pursue other "better" sexual partners by having sex outside their current relationship. Also, men who want to find a better sexual partner may be more prone to having UAI with an outside partner, particularly, if they are wanting to replace their current sexual partner and build a committed sexual partnership with this individual.

It is also possible that gay men in some of the couples may have thought that other sexual partners did exist for them, but more as a fact and not necessarily that they wanted to replace their main sexual partner. Gay male couples did report that they were satisfied and committed to their relationship, however, the perception that a better partner exists was still strongly related to some of these gay men having UAI with someone else. Overall, gay men had UAI with someone other than their main sexual partner and they thought a better sexual partner existed for them. Whether these men were "partner shopping" remains unknown and what is known is that having UAI with someone else increases the likelihood of these men infecting their main partner with HIV.

Employment Provides Protection

Gay male couples who were employed were significantly less likely to have had UAI with an outside partner or be at higher risk for contracting HIV. This study is the first to report such a finding among gay male couples. Two previous studies with gay men reported no significant association between employment and UAI (Elford et al., 1999; Elford et al., 2001), however, a study on heterosexual risk for HIV reported a significant association between employment and condom use among Puerto Rican women (Saul et al., 2000). Several explanations are plausible as to why employment may serve as a protective factor against UAI with outside partners and HIV risk among gay male couples.

The state of the economy in Oregon and Washington was dramatically affected while the present study had occurred; unemployment rates greatly increased. Despite the negative changes in the economy, about 75% of the gay male couples were employed. Those who were employed may have had less free time to engage in other activities, including sex outside of the relationship. The lack of free time was evident while trying to recruit and coordinate schedules of gay male couples to participate in the present study; those who were unemployed were much easier to schedule to participate in the study. In addition, gay men who were employed may have had a higher self-esteem and self worth because they were employed when compared to some of their peers who were unemployed. The employed men may have also valued their relationship more because it represented stable component in their life during a time period of economic instability. The combination of having less free time,

increased self worth, and value toward their relationship may have all been plausible factors to help explain why being employed served as a protective factor against UAI with outside partners and HIV risk among gay male couples.

In contrast, about 25% of gay male couples had either one or both men unemployed in the present study. Conceivably, gay men who were unemployed may have had more time to pursue other activities, including sex outside of the relationship; findings reported by LaSala supported this possibility (2004a). The effects of being unemployed may have produced a less positive self- esteem, self worth, and general malaise about not contributing as much financially to the relationship among the gay male couples who were unemployed. Gay men who were unemployed may have used sex with outside partners to help increase their self worth, self-esteem, and possibly, as a means of producing an income by escorting. The possible decrease in mental health and increase in UAI with outside partners among those who were unemployed helps to explain how being employed served as a protective factor among gay male couples in the present study.

Risk Rationalization

The overwhelming majority of gay men did not use condoms for anal sex with their main partner. This finding has been supported in a number of other studies with gay male couples (Appleby et al., 1999; Blais, 2006; Crawford et al., 2003; Davidovich et al., 2000; 2004; 2006; de Vroome et al., 2000; Fitzpatrick et al., 1994; Hoff & Beougher, 2008; Hoff et al., 2009; LaSala, 2004a; 2004b; McNeal, 1997; Prestage et al., 2006; Prestage et al., 2008; Worth et al., 2002) and is consistent with

theory; as an individual perceives a greater commitment, intimacy, and love with his

main partner, his perceived vulnerability to HIV would decrease, leading to him and

his partner to not use condoms. Within this study of gay male couples, a smaller subset

of men also did not use condoms for anal sex with other partners. Unprotected anal

intercourse with outside partners was significantly associated with couples having a

less positive attitude about using condoms with outside partners.

A number of possibilities exist to help explain why gay men with negative

attitudes toward using condoms were having unprotected anal sex with men outside

their relationship. Since the beginning of the HIV epidemic, gay men have been

consistently exposed to HIV prevention messaging, campaigns, and related services.

The constant emphasis to use condoms for anal sex may have resulted in a form of

backlash known as "condom or safe sex fatigue" (Adam et al., 2005; Kellogg, 2002;

Wolitski, 2005). This type of fatigue may be particularly true as better antiretroviral

therapies for HIV are created with fewer side effects and become much more readily

available, making the disease more manageable and possibly perceived as less severe.

As such, previous studies with gay men have described the more positive attitude

toward HIV with respective to better available medications as "AIDS or Treatment

optimism" (Adam et al., 2005; Crepaz et al., 2004; Halkitis et al., 2004; Koblin et al.,

2003; Rowniak, 2009; Sullivan et al., 2006; Vanable et al., 2000; Wolitski, 2005). The

constant emphasis that is placed on gay men regarding HIV may have resulted in a

general indifference about the disease. In opposition to using condoms for anal

intercourse as evidenced by the study finding, gay men have adopted other strategies

to decrease their risk for contracting HIV, such as serosorting (CDC, 2007a; 2009; Eaton et al., 2009) and strategic positioning (CDC, 2009; Eaton et al., 2009; Parsons et al., 2005; Van De Ven et al., 2002).

Beyond the indifference toward condom use and HIV, gay men may be motivated to fulfill their sexual desires when sex is associated with a conquest or doing something that they know they should not be doing, such as UAI with a non-main partner. Some gay men associate riskier sexual behaviors as conquests to earn praise from their peers, which would emphasize the praise given for sexual freedom within the gay male community. To help reduce the risk for contracting HIV, some gay men might justify their less positive attitude about using condoms for UAI with non-main partners by practicing other HIV prevention techniques, such as serosorting, strategic positioning, and frequent HIV testing; strategies used to help prevent HIV infection but are not nearly as effectives as correct and consistent condom use.

Other Explanations

The exploratory nature of this study detected fewer relationship factors that were associated with HIV risk and UAI with non-main partners than what was anticipated among the sample of gay male couples. Also, no partner effects were detected, another surprise among the study findings. Other explanations, including measurement error and other additional relationship factors may exist to account for why so few relationship factors and no partner effects were associated with HIV risk among gay male couples are described next.

Measurement error. Measurement error may have altered the study findings. Although measures of trust, relationship commitment, and investment in sexual agreements were previously validated with high reliability among gay male couples, the present study obtained lower reliability scores for trust and relationship commitment. It is possible the study sample may have interpreted the questions of these two measures differently than what was previously tested in other studies. As such, more factors related to trust and relationship commitment may have been significantly associated with UAI with non-main partners and higher risk for HIV than what was reported. Furthermore, other actor-partner effects might have also been detected to predict higher risk for HIV among gay male couples. A focus group was held, however, to obtain feedback to ensure the format and word choice in the study questionnaire was culturally appropriate with gay male couples in the Pacific Northwest.

Measurement error may have also impacted how the gay men answered questions asked about their relationship characteristics. Categorical responses may not have been as culturally accurate or inclusive. Study participants may have then been unable to relate to the choice of responses to these questions, particularly those that asked about their type of sexual relationship and sexual agreement type. It is possible that more couples could have either been concordant or discordant on these characteristics than what was reported. Additional assessments of culturally appropriate descriptors of relationship characteristics must be incorporated in the early stages of future research with gay male couples.

Additional relationship factors. Actor and partner effects were estimated to determine how much of an influence a gay man would have on his partner regarding a particular relationship factor to predict high HIV risk. Only actor effects of certain relationship factors were significant in predicting high HIV risk while partner effects were not. To date, no other study had estimated actor-partner effects on relationship factors for HIV risk among gay male couples. The question of why partner effects were not significant remains unknown, but two plausible explanations are provided.

When both men in the couple consider each other equal and respond similarly in respect to their relationship characteristics, then each man would have almost identical scores. If this was true, their influence on one another would be the same and as such, only an actor effect would have been found to be statistically significant and not a partner effect, as was the case for the present study. In other words, actor effects suggest that both men in a couple were fairly independent and did not have much influence on one another with respect to their relationship characteristics and HIV risk; the presence of an partner effect would indicate that one partner was influential, or interdependent on the other partner.

An additional explanation suggests that other relationship factors exist and may have been more likely to detect the influencing effects between both partners within a relationship. For example, personal expectations of the partner and relationship, overall desire to be in a relationship, social support from and to the partner, sexual satisfaction, priority of health (sexual, physical, emotional, and mental), and power are all additional factors that may have been more accurate and

better able to highlight how one gay man influences his main sexual partner's risk for HIV.

Limitations

The present study has limitations that should be noted. First, a convenience sample was used instead of a probability sample. Findings from the present study therefore had limited generalizability. Demographic data was collected to provide a detailed characterization of the sample to allow for comparison to those of other studies. Second, data collected for the study relied on the self-report of the participants. Although the present study used techniques that were recommended to insure the confidentiality and anonymity of the study participants (Catania et al., 1990), under-reporting of sexual risk behaviors might have still occurred due to social desirability bias. Twenty percent of couples in the sample were at high risk for contracting HIV; a smaller percentage than what was anticipated considering the number of couples that had an open relationship or that were discordant about their relationship or type of sexual agreement. As such, the data may reflect a halo effect because participants wished to represent themselves in a more favorable light.

Another limitation of the study included selection bias. Certain couples might have been more motivated and interested to participate in the study than others. Their motivation and interest may influence how each study participant responds to the survey questions. In addition, couples who were more stable might have been more likely to participate in the study than couples who were in conflict about their

relationship. As such, couples who were more stable and with a personal self-interest to participate may have been over-represented in the study sample.

The study name and recruitment materials used to recruit the sample, *The Boyfriend Study*, may have also limited the type of sample obtained. This bias may have prevented couples from participating if they did not identify with the term 'boyfriend' or were sensitive about any of the eligibility criteria, such as anal sex.

Two additional limitations were present because of the type of study design used for this research. Because the present study used a cross-sectional study design, findings were limited and unable to determine causality or temporal associations between the relationship factors and risky sexual behaviors. Despite these limitations, the present study did strengthen the limited body of literature by contributing additional information to better understand which relationship factors among gay male couples were associated with high HIV risk and UAI with non-main partners.

Implications for Public Health

Findings from the present study offer valuable information to better understand how relationship factors are associated with high HIV risk and UAI with non-main partners among gay male couples. In order to reduce HIV incidence, programs and initiatives must focus on strengthening communication skills and improving specific relationship characteristics among gay male couples. Prevention services for couples are particularly important because of the interdependent behavior of sex. The following sections provide information for why future initiatives and programs must focus on these topics for gay male couples.

Focus on Strengthening Communication Skills

The present study reported few couples chose their sexual agreement to be monogamous whereas others chose to have a sexual agreement that incorporated sex with a non-main partner. Many more couples were actually discordant about having a sexual agreement, indicating that miscommunication existed within the couples about having a sexual agreement. In addition, 90% of the couples had UAI with each other and 10% had UAI with a non-main partner. The combination of discordance on sexual agreement, few choosing monogamy, majority having UAI with their main partner, and some having UAI with a non-main partner, suggests couples are not explicitly communicating about sexual agreements and are at risk for contracting HIV and other sexually transmitted infections.

Communication about having a sexual agreement and the type of sexual agreement are two key strategies for minimizing HIV transmission among gay male couples (Hoff et al., 2009). If gay couples are selecting to forego traditional monogamy and using condoms with their main partner, then other preventive methods must be incorporated, followed, and maintained between both members within each couple. Options for other preventive methods for minimizing HIV transmission might include forgoing anal intercourse with non-main partners, correctly and consistently wearing condoms with all partners or just with non-main partners, actively serosorting, and frequent HIV and STI screening. One possible location to help couples enhance their communication skills about sexual agreement and sexual risk behaviors would be

through HIV and STI screening services exclusively for gay male couples. To date, no such wide-scale service exists in the United States.

Another option would be to encourage more gay male couples to establish a sexual agreement of monogamy. Results from the present study indicated couples who chose their sexual agreement to be monogamous were five times more likely to have been together less than five years and have a higher level of commitment toward their agreement. Community-based organizations that provide services to MSM could adopt and provide specific programming to gay male couples to emphasize the relationship and health advantages of having a monogamous agreement versus a non-monogamous sexual agreement.

Besides focusing on improving communication skills about sexual agreements, public health programs must also provide services to help gay couples improve on certain relationship characteristics for lowering their odds of having UAI with non-main partners and consequently, their risk for contracting HIV. The next section provides data in support of why programs must focus on helping gay couples improve certain relationship characteristics as a HIV prevention strategy.

Focus on Improving Relationship Characteristics

Programs must address couples who perceived better alternatives for sexual relationships (when compared to their own relationship) were more likely to have UAI with other partners and be at high HIV risk. In addition to addressing this factor, programs must also focus on predictability for trust along with the individual factor of attitude on future condom use with other partners. To start, counseling and education

initiatives that focused on improving relationship quality among gay male couples may help reduce their perception of better alternatives. In addition, programs need to focus on various aspects of trust, including perceived predictability of partner, to help improve gay male couples relationships. Although not a relationship characteristic, programs must also address how attitudes toward condom use with other partners were associated with increased sexual risk among gay male couples.

Besides programs offering counseling and education classes that address each of the above mentioned relationship factors, advertisement and related-campaign initiatives could be used to help advertise such programming as well as to increase awareness on gay couple's risk for HIV. Furthermore, such efforts could be specifically targeted toward couples in their thirties and older as well as those who have at least one partner unemployed; two factors that were associated with either having UAI with other partners or high HIV risk. Because an individual focus was used in the majority of previous HIV prevention efforts for gay men, any increase in programming, advertising, and other educational initiatives that addresses these particular relationship factors will undoubtedly help reduce HIV incidence among gay men and their main sex partners.

The public health implications presented offer key suggestions on how public health organizations can help reduce HIV incidence among gay male couples. Beyond these suggestions, new research on how relationship characteristics and dynamics affect HIV risk among gay male couples may also provide additional insight to help improve future HIV prevention strategies that specifically target gay male couples.

The next section will describe areas for future research in order to reduce HIV incidence among gay male couples.

Areas for Future Research

Few studies with gay couples exist, particularly those that focus exclusively on better understanding relationship factors and risky sexual behaviors. Future research with gay male couples must focus on using theories, data collection efforts, and analytical techniques that emphasize the dyad as the unit of analysis. The interdependent nature of sex, that is, it takes two individuals to have UAI, is key to revealing the dynamics that occur between gay male couples. Accordingly, more research with gay male couples is needed in the following areas: patterns of concordance, cause and effect, more efficient recruitment strategies, and examining other relationship factors associated with risky sexual behaviors.

Research on patterns of concordance among gay male couples will allow researchers to better understand how members differ or are similar on relationship factors and sexual behaviors within each dyad. Concordance will also allow researchers to learn whether gay male couples are communicating about their HIV status, type of relationship, sexual agreements, and disclosure of any breaks on their agreements. Overall, examining concordance on relationship factors among dyads will allow researchers to better understand the dynamics among gay male couples. The information can then be utilized for designing better HIV prevention programs and messaging.

Although the present study was important, the one main limitation pertained to the inability to establish a causal relationship. A longitudinal study design provides data to determine temporal association for revealing which relationship factors and sexual risk behaviors have a cause-effect relationship. Dyadic data collected from a longitudinal study could definitively provide evidence on which relationship factors influence gay men to have risky sex while they are in a primary relationship. Regarding gay male couples at risk for HIV, establishing causal inference provides a better understanding on what causal factors precede their sexual risk behaviors; important information that could be used to influence the future of HIV prevention strategies.

The present study collected dyadic data from 144 gay male couples in Portland, Oregon and Seattle, Washington. Several recruitment strategies were used to obtain this sample size. Due to the nature of recruiting anonymous, indistinguishable dyads, a response rate could not be calculated. A calculated estimate of the response rate suggested that for every 100 couples who expressed interest in participating in the study about half of them followed through and did participate in the study. Among the couples who decided not to participate, the three most common reasons for not doing so were 1) ineligibility, 2) inconvenience, and 3) sensitivity about their relationship. Many couples stated they were unwilling to make an appointment in order to participate. Other men shared that their partners were uncomfortable taking the anonymous survey; most likely due to the possibility of the couple discussing what each had disclosed on the survey.

Future research with gay male couples must acknowledge the difficulties of recruiting both members in a dyad. New methods for collecting dyadic data are needed and necessary in order to obtain a more representative sample. For example, a research design could incorporate a system that allows each male in a gay couple to take his survey in the comfort of his home. One important consideration for designing such a recruitment and data collection system would be to reduce as much bias as possible. In addition, other technologies, including smart phones, could also be used to obtain dyadic data instantaneously from gay male couples while they are attending social events. In summary, additional recruitment strategies are needed to obtain more representative samples of gay male couples in future research studies.

Another area for future research is to explore what other relationship factors exist to explain why gay male couples are at risk for HIV. For instance, little to no research with gay male couples exists on the relationship dynamic of power. Qualitative research is needed to explore how power and other dynamic factors are tied to sexual risk behaviors among gay men and their main sexual partners. Data from the present study will provide some new information on how gay men and their main sexual partner perceive power and who has the most power in their relationship.

Conclusion

Findings from the present study provide new information to help explain why gay men are more likely to contact HIV from their main sexual partner than from casual partners. Key strategies on how to reduce new HIV infections among gay male couples are given for Public Health professionals and organizations to incorporate into

their HIV prevention programming. The complexity of sexual relationships among gay male couples must be considered for future research and HIV prevention strategies with this population.

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APPENDICES

APPENDIX A: ELECTRONIC CONSENT FORM

Project Title: HIV Risk among Gay Couples: Exploring Relationship Dynamics and Characteristics.

Principal Investigator: S. Marie Harvey, PhD, Professor of Public Health

Student Researcher: Jason W. Mitchell, MPH

What is the purpose of this study?

You are being invited to take part in a research study designed to examine if and how relationship characteristics and dynamics are associated with sexual risk taking among gay couples. Your opinions and beliefs are valued to help better understand which relationship factors are associated with HIV risk among gay couples. By participating, your insight on this topic will help provide much needed information for future HIV prevention strategies. This study is important because not much is known about the intricacies of gay couple relationship factors on sexual risk behavior. The intended use for this research will be for publication purposes, presenting at Public Health related conferences, and for doctoral program requirements.

What is the purpose of this form?

This consent form gives you the information you will need to help you decide whether to be in the study or not. Please read the form carefully. You may ask any questions about the research, the possible risks and benefits, your rights as a volunteer, and

APPENDIX A: ELECTRONIC CONSENT FORM (Continued)

anything else that is not clear. When all of your questions have been answered, you can decide if you want to be in this study or not.

What am I being invited to take part in this study?

You are being invited to take part in this study because you and your boyfriend/main sexual partner meet the following study criteria to participate in this study:

- Male who identifies as gay, bisexual, homosexual, or queer;

- Age of 18 or older;

- Are in a sexual relationship with a male of similar sexual identity;

- Have been in your relationship for at least three months;

- Have had anal intercourse within the past three months;

- Have either negative or unknown HIV serostatus; &

- Live in the Pacific Northwest region.

What will happen during this study and how long will it take?

If you agree to take part in this study, you will be asked to fill out an electronic survey about some demographic, relationship characteristics, relationship dynamics, and individual characteristics of yourself and your boyfriend/main sexual partner. Completing this survey will require you to use a laptop computer provided by the

APPENDIX A: ELECTRONIC CONSENT FORM (Continued)

student researcher at a predetermined location convenient to you and the student

researcher. Upon completion of the electronic survey, you will be thanked for your

participation and given an incentive as a token of gratitude for your time. The entire

process, excluding travel time, but including completion of survey, will occur one time

and will last approximately 30 - 45 minutes.

What are the risks of this study?

Possible risks or discomforts:

• You may experience temporary emotional discomfort from taking this survey. This

may cause some distress as answering questions about sensitive topics may create

some uncomfortable feelings for some individuals. If you are feeling uncomfortable

and would like to talk to someone about this, then you may contact the Boys Town

Suicide and Crisis Line at 1 (800)-448-3000 or 800-448-1833 (TDD).

• This crisis line provides short-term crisis intervention and counseling and referrals to

local community resources. Counsels on parent-child conflicts, marital and family

issues, suicide, pregnancy, runaway youth, physical and sexual abuse, and other

issues. Operates 24 hours, seven days a week.

APPENDIX A: ELECTRONIC CONSENT FORM (Continued)

What are the benefits of this study?

I do not know if you will benefit from being in this study. However, I hope that, in the future, other gay couples might benefit from this study because of the information gained on better understanding if and how relationship factors are associated with sexual risk behavior among gay couples.

Will I be paid for participating?

You and your boyfriend/partner will be given a gift card value not to exceed $5 for participating in this study. The gift card will be given to you and your boyfriend after you have read the consent document, have decided to participate by taking the electronic survey (or not), and are ready to leave. The student researcher will then give you and your boyfriend the gift card as a token of thanks.

Who will see the information I give?

Any information that you give will be kept confidential to the extent permitted by law. To help protect your confidentiality, a code number will be given to you instead of collecting any personal identifying information. Neither your name nor any information from which you might be identified will be used in any data summaries (including transcripts) or publications. The study team will see the information you've

provided on the survey based on your participation code number. All answers will be assessed on an individual, couple, and location basis. Since no personal identifying information will be collected from you, your responses will remain anonymous.

Do I have a choice to be in the study?

If you decide to take part in the study, it should be because you really want to volunteer. You will not lose any benefits or rights you would normally have if you choose not to volunteer. You can stop at any time during the study and still keep the benefits and rights you had before volunteering.

You will not be treated differently if you decide to stop taking part in the study. You may skip any questions that you are not comfortable answering without adverse effects. If you choose to withdraw from this project before it ends, the researcher may keep any information collected about you and this information may be included in study reports.

The investigators may also want to use your answers and questionnaire information for future studies.

APPENDIX A: ELECTRONIC CONSENT FORM (Continued)

If you have any questions about this research project, please contact:

Dr. S. Marie Harvey, Professor of Public Health: 503-737-3824

Jason W. Mitchell, MPH, Public Health Doctoral Candidate: 310-663-3965

If you have questions about your rights as a participant, please contact the Oregon State University Institutional Review Board (IRB) Human Protections Administrator, at (541) 737-4933 or by email at IRB@oregonstate.edu.

Your signature is not required since this is an electronic consent form. A copy of this consent form will be given to you by the student researcher before you leave. If you have any questions about this study, please ask the student researcher before agreeing to take the electronic survey.

By selecting and clicking on the survey button below, you have indicated that this research study has been explained to you, that your questions have been answered, and that you agree to take part in this study by taking the electronic survey.

APPENDIX B: ELECTRONIC QUESTIONNAIRE

Welcome to the Boyfriend Study. Your honest input for this study is highly valued. To assure your privacy, the research team will not collect any personal identifying information and your answers will remain anonymous. For your convenience, the survey has been divided into five main sections to include your demographic information, relationship characteristics, relationship dynamics, individual characteristics, and a brief commentary section. At any given time, you may stop taking the survey.

1. Please enter your ID number: _____

2. The investigators may also want to use your answers to this survey for future studies. Please select either yes if you agree that they may use them or no if you do not want your information to be used in future studies.

- Yes
- No

APPENDIX B: ELECTRONIC QUESTIONNAIRE (Continued)

Demographics

Each of you who take this survey are in a sexual relationship with another man. The man who is taking this survey at the same time as you will be referred to as your "boyfriend" for purposes of this study.

3. How old are you? __

4. What is your gender?

- Male

- Female

- FTM

- MTF

5. Which ethnicity do you identify with most?

- Hispanic / Latino

- Non-Hispanic / Non-Latino

APPENDIX B: ELECTRONIC QUESTIONNAIRE (Continued)

6. Which race do you identify with most?

- African American

- American Indian

- Alaskan Native

- Asian

- Caucasian

- Mixed

- Native Hawaiian

- Other

- Pacific Islander

7. Please select the highest level of education achieved.

- Did not complete High School

- High School Diploma or G.E.D.

- Some college, Associate Degree, or Trade Certification

- Bachelors Degree

- Masters Degree

- Doctoral or other professional degree

APPENDIX B: ELECTRONIC QUESTIONNAIRE (Continued)

8. What is your current employment status?

- Employed full-time

- Employed part-time

- Self-employed

- Unemployed

- Student

9. Which income bracket would you personally fall into? Please do not include anyone else's income, including your boyfriend's.

- None

- Less than $30,000

- $30,001 - $60,000

- $60,001 and higher

10. Which geographical area best describes where you currently live?

- Urban / city

- Suburbs

- Rural

11. Based on where you currently live, which city is closest to you?

- Portland, OR

- Seattle, WA

12. Of the options below, please select the one that best describes your sexual identity.

- Gay/Homosexual

- Bisexual

- Queer

13. Do you and your boyfriend live together where you both share the same mailing address?

- Yes

- No

14. How long have you and your boyfriend been living together?

- Does not apply; We don't live together

- Less than 6 months

- 6 months to 1 year

- More than 1 year

15. How long have you and your boyfriend been in a sexual relationship?

- 3 – 6 months

- 6 months – 1 year

- 1 – 2 years

- 2 – 5 years

- 5 – 10 years

- More than 10 years

APPENDIX B: ELECTRONIC QUESTIONNAIRE (Continued)

Relationship Characteristics

For each question in this section, please select the answer that best relates to you and your boyfriend. Some questions will be asked about your sexual behaviors.

16. If you were asked to describe the type of relationship you have with your boyfriend, which of the categories would you select below?

- Strictly monogamous

- Monogamous, but we have threesomes

- Open, but restricted on what we can do and with whom

- Open with anything goes

17. Within the last three months, have you had unprotected anal sex (no condom) with your boyfriend?

- Yes

- No

18. When you had unprotected anal sex (no condom) with your boyfriend, did you top, bottom, or both?

- Top / Insertive

- Bottom / Receptive

- Both / Versatile

19. Within the last three months, have you had anal sex without a condom with someone other than your boyfriend?

- Yes

- No

20. When you had anal sex without a condom with someone other than your boyfriend, did you top, bottom, or both?

- Top / Insertive

- Bottom / Receptive

- Both / Versatile

21. Have you and your boyfriend made a sexual agreement in your relationship? A sexual agreement can be thought of as a "contract" that describes what you and your boyfriend can do sexually with each other and/or with other persons.

- Yes

- No

22. Do you want to have a sexual agreement with your boyfriend?

- Yes

- No

- Not sure

23. Do you think your boyfriend wants to have a sexual agreement with you?

- Yes

- No

- Not sure

24. Which description best describes the sexual agreement type you have with your boyfriend?

- We only have sex with one another

- We have sex with each other and while together, we also have sex with others too (i.e. threesomes, groups, etc.)

- We have sex with each other and he can have sex with others, but I cannot

- We have sex with each other and I can have sex with others, but he cannot

- We can have sex with whomever whenever without any restrictions

25. When you and your boyfriend created or talked about your sexual agreement, was it implied or explicit?

- Implied – was not necessarily discussed clearly or in great detail; was more assumed

- Explicit – was discussed clearly and in detail

26. Since the time your sexual agreement was made between you and your boyfriend, have you broken your sexual agreement in any way?

- Yes

- No

- Not sure

27. Have you told your boyfriend that you broke your sexual agreement with him?

- Yes

- No

28. Has your boyfriend kept his sexual agreement with you?

- Yes

- No

- Not sure

29. Do you think you completely understand the sexual agreement you have with your boyfriend?

- Yes

- No

- Not sure

APPENDIX B: ELECTRONIC QUESTIONNAIRE (Continued)

30. Do you think your boyfriend completely understands the sexual agreement he has with you?

- Yes

- No

- Not sure

Relationship Dynamics of Sexual Agreement

I am now interested in your attitudes about the sexual agreement you have with your boyfriend. By "current agreement" I mean the agreement you selected earlier when this question was asked:

"Which description best describes the sexual agreement type you have with your boyfriend?

- We only have sex with one another

- We have sex with each other and while together, we also have sex with others too (i.e. threesomes, groups, etc.)

- We have sex with each other and he can have sex with others, but I cannot

- We have sex with each other and I can have sex with others, but he cannot

- We can have sex with whomever whenever without any restrictions"

APPENDIX B: ELECTRONIC QUESTIONNAIRE (Continued)

[Questions 31-43 had the following likert-type scale response options: 0 = Not at all;
1 = A little; 2 = Moderately; 3 = Very Much; 4 = Extremely]

31. How much do you appreciate having your current agreement?

32. How much do you value your current agreement?

33. How much do you respect your current agreement?

34. How important is your current agreement to you?

35. How much does your current agreement matter to you?

36. How much do you benefit from having your current agreement?

37. How important is it for you to be committed to your current agreement?

38. How important is it for you that your boyfriend is committed to your agreement?

39. How important is it to you that both you and your boyfriend are equally committed
to your current agreement?

40. How committed are you to having your current agreement?

41. How satisfied are you with your current agreement?

42. How much does satisfaction with your current agreement influence satisfaction
with your relationship?

43. How important is it that you feel satisfied with your current agreement?

APPENDIX B: ELECTRONIC QUESTIONNAIRE (Continued)

More Relationship Characteristics

44. What is your current HIV status?

- Unknown or not sure

- Negative

- Positive

45. When was your most recent HIV test?

- Never been tested before

- Less than 3 months ago

- 3 – 6 months ago

- More than 6 months ago

46. What is your boyfriend's current HIV status?

- Unknown or not sure

- Negative

- Positive

47. When was your boyfriend's most recent HIV test?

- Never been tested before

- Less than 3 months ago

- 3 – 6 months ago

- More than 6 months ago

APPENDIX B: ELECTRONIC QUESTIONNAIRE (Continued)

Relationship Dynamics of Trust

For the next set of questions, please select from the following answer choices to indicate the extent to which you agree or disagree with the following statements as they relate to your boyfriend.

[Questions 48-64 had the following likert-type scale response options: -3 = Strongly Disagree; -2; -1; 0 = Neutral; 1; 2; 3 = Strongly Agree]

48. My boyfriend has proven to be trustworthy and I am willing to let him engage in activities which other partners find too threatening.

49. Even when I don't know how my boyfriend will react, I feel comfortable telling him anything about myself, even those things of which I am ashamed.

When was your most recent HIV test?

50. Though times may change and the future is uncertain, I know my boyfriend will always be ready and willing to offer me strength and support.

51. I am never certain that my boyfriend won't do something that I dislike or will embarrass me.

52. My boyfriend is very unpredictable. I never know how he is going to act from one day to the next.

APPENDIX B: ELECTRONIC QUESTIONNAIRE (Continued)

53. I feel very uncomfortable when my boyfriend has to make decisions which will affect me personally.

54. I have found that my boyfriend is unusually dependable, especially when it comes to things which are important to me.

55. My boyfriend behaves in a very consistent manner.

56. Whenever we have to make an important decision in a situation we have never encountered before, I know my boyfriend will be concerned about my welfare.

57. Even if I have no reason to expect my boyfriend to share things with me, I still feel certain that he will.

58. I can rely on my boyfriend to reach in a positive way when I expose my weaknesses to him.

59. When I share my problems with my boyfriend, I know he will respond in a loving way even before I say anything.

60. I am certain that my boyfriend would not cheat on me, even if the opportunity arose and there was no chance that he would get caught.

61. I sometimes avoid my boyfriend because he is unpredictable and I fear saying or doing something which might create conflict.

62. I can rely on my boyfriend to keep the promises he makes to me.

63. When I am with my boyfriend, I feel secure in facing unknown new situations.

APPENDIX B: ELECTRONIC QUESTIONNAIRE (Continued)

64. Even when my boyfriend makes excuses which sound rather unlikely, I am confident that he is telling the truth.

Relationship Dynamics of Commitment

[Questions 65-86 had the following likert-type scale response options: 0 = Do Not Agree at All; 1; 2; 3 = Neutral; 4; 5; 6 = Agree Completely]

65. I am committed to maintaining my relationship with my boyfriend.

66. I want our relationship to last for a very long time.

67. I feel very attached to my relationship – very strongly linked to my boyfriend.

68. It is likely that I will date someone other than my partner within the next year.

69. I would not feel very upset if my relationship were end in the near future.

70. I want my relationship to last forever.

71. I am oriented toward the long-term future of my relationship.

72. I feel satisfied with my relationship.

73. My relationship is much better than others' relationships.

74. My relationship is close to ideal.

75. My relationship makes me very happy.

76. My relationship does a good job of fulfilling my needs for intimacy.

APPENDIX B: ELECTRONIC QUESTIONNAIRE (Continued)

77. My alternatives to my relationship are attractive to me (i.e. being single, other men, etc.).

78. My alternatives to my relationship are close to ideal (i.e. other prospects for a relationship).

79. If I weren't dating my boyfriend, I would do fine – I would find another appealing sexual relationship.

80. Men other than my boyfriend are very appealing.

81. My needs for intimacy, companionship, etc., could easily be fulfilled by another partner.

82. I have put a great deal into our relationship that I would lose if it were to end.

83. Compared to other people I know, I have invested a great deal in my relationship.

84. I feel very involved in my relationship – like I have put a great deal into it.

85. Many aspects of my life have become linked to my boyfriend.

86. My relationships with friends and family members would be complicated if my relationship were to end.

APPENDIX B: ELECTRONIC QUESTIONNAIRE (Continued)

Individual Characteristics

This next section will ask you questions related to individual characteristics on condom use with your boyfriend and any other sexual partners.

[Questions 87-91 & 94, 95 had the following likert-type scale response options: 1 = I most certainly do not; 2; 3; 4; 5; 6; 7 = I mostly certainly do. Questions 92 & 93 had the following likert-type scale response options: -3 = They would disapprove; -2; -1; 0 = Neutral; 1; 2; 3 = They would approve]

87. What do you think about using condoms in the future with your boyfriend?

88. What do you think about using condoms in the future with other sexual partners other than your boyfriend?

89. Do you intend to use condoms in the future with your boyfriend?

90. Do you intend to use condoms in the future with any other sexual partners other than your boyfriend?

91. How much do you value the opinion of your gay friends?

92. How would most of your gay friends feel if you were to use condoms in the future with your boyfriend?

93. How would most of your gay friends feel if you were to use condoms in the future with other sexual partners other than your boyfriend?

APPENDIX B: ELECTRONIC QUESTIONNAIRE (Continued)

94. Do you feel able to use condoms in the future with your boyfriend?

95. Do you feel able to use condoms in the future with other sex partners other than your boyfriend?

Commentary

The information you have provided for this survey is invaluable. Thank you for providing your honest feedback. This last section contains a few questions asking for you to share some additional information about your current relationship.

96. If you had to describe the current state of your relationship in as few words as possible, what would you say?

97. Thinking about the relationship you have with your boyfriend, who would you say has the most power in your relationship?

- Myself

- My boyfriend

- Neither – equal

98. Given your answer to who has the most power in your relationship, why did you say this person has the most power?

99. Please use the space below to share anything else you would like the research team to know about your current relationship.

APPENDIX B: ELECTRONIC QUESTIONNAIRE (Continued)

The End

You're all done. Thank you for completing The Boyfriend Study survey! Please hit "done" so your responses are saved. Once this is done, please see Jason so he may give you and your boyfriend a small gift cart as a token of appreciation.