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Anna N. Chard 22 April, 2013

Social Stressors, Risk Taking, and HIV Risk Perceptions among Men who have Sex with Men in Seven Countries

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Social Stressors, Risk Taking, and HIV Risk Perceptions among Men who have Sex with Men in Seven Countries

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An abstract of
a thesis submitted to the Faculty of the
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Abstract

Social Stressors, Risk Taking, and HIV Risk Perceptions among Men who have Sex with Men in Seven Countries

By Anna Chard

Background: Men who have sex with men **(**MSM) continue to be disproportionally affected by the HIV/AIDS epidemic. Previous studies have focused on individual-level characteristics as drivers of risk behaviors, while little research has examined the role of the socio-cultural factors and social stressors that place MSM at a greater risk for negative health effects.

Objective: To examine the relationships between social stresses, social networks, drug and alcohol use, HIV risk perceptions, and sexual risk taking among MSM in seven countries.

Methods: Sexually active MSM aged over 18 and residing in Australia, Brazil, Canada, South Africa, Thailand, the United Kingdom, and the United States were recruited through Facebook. The study examined 7 outcomes, divided into three manuscripts:

1. Reporting experiences of external homophobic discrimination and reporting feelings of internalized homophobia were examined through linear regression. Covariates of interest included demographic characteristics, recent sexual behaviors, and social network size.
2. Reporting recent drug use and reporting intoxication at last intercourse were examined through logistic regression. Covariates of interest included demographic characteristics, measures of social stress, and social network size.
3. Perceived seriousness of HIV sero-conversion, perceived risk of contracting HIV, and perceived lifetime inability to remain HIV sero-negative were examined through linear regression. Covariates of interest included: demographic characteristics, measures of social stress, and recent sexual behavior.

Results: Reporting of internal and external homophobic discrimination was widespread. Both self-reported drug use and participation in intoxicated sex were high. HIV infection was universally perceived as serious, but HIV risk perceptions were low despite participations in sexual risk-taking.

Conclusion/Implications: Results demonstrate the ameliorative effect of social networks on experiencing homophobia and engaging in HIV risk behaviors, and highlight the need for inclusion of homophobia as a physical and mental health risk factor. Additional research should focus on incorporating experiences of homophobia in HIV/AIDS and STI counseling and testing tools.

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Finally, to the men around the world who completed the surveys that made this research possible- thank you for the selfless dedication of your time and the disclosure of your deeply personal information for the pursuit of science and justice.

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Author's note: The term "men who have sex with men" (MSM) was first introduced in 1992 (Doll, Petersen, White, & Ward, 1992) in order to define male-male sexual behavior without characterizing this behavior based on sexual orientation (homosexual, bisexual, heterosexual), gender identity (male, female, transgender, queer), or socio-cultural constructions (Doll et al., 1992; Khan & Khan, 2006; Pathela, Blank, Sell, & Schillinger, 2006; Young & Meyer, 2005). MSM is a broad category, inclusive of (but not limited to) gay- and bisexually-identified men, heterosexually-identified men who have sex with men, and male sex workers of any orientation/preference. As such, the term lacks specificity, and the significant differences in HIV risk between these sub-populations are recognized. Despite these shortcomings, MSM is a widely used term in scientific literature on HIV, and we use it in these papers for standardization and comparability purposes.

Chapter I: Introduction

Men who have sex with men (MSM) are disproportionately affected by the HIV/AIDS epidemic in the United States, and have been since in 1981 when previously healthy homosexual men in California and New York City were diagnosed with what is now known as AIDS (Centers for Disease Control and Prevention, 1981). Today, while incident HIV infections are stable or decreasing among other risk groups (Hall et al., 2008), incident infections continue to increase among MSM in the United States (Centers for Disease Control and Prevention, 2010), Western Europe, and Australia (Sullivan et al., 2009). In the developing world, HIV/AIDS was historically most prevalent among heterosexuals, injection drug users (IDUs), and commercial sex workers (CSWs) (Beyrer et al., 2011). However, a recent trend of emerging epidemics among MSM in low- and middle-income countries (LMICs) is now mirroring the epidemics seen in the U.S. and in other developed countries, and incident HIV infection among MSM is either increasing or remaining at a level sufficient to sustain the epidemic (Baral, Sifakis, Cleghorn, & Beyrer, 2007; Beyrer et al., 2012; Beyrer et al., 2011; van Griensven, de Lind van Wijngaarden, Baral, & Grulich, 2009). Moreover, the HIV prevalence among MSM is higher than that of the general population in every region of the world (**Figure 1**)(Beyrer et al., 2012).

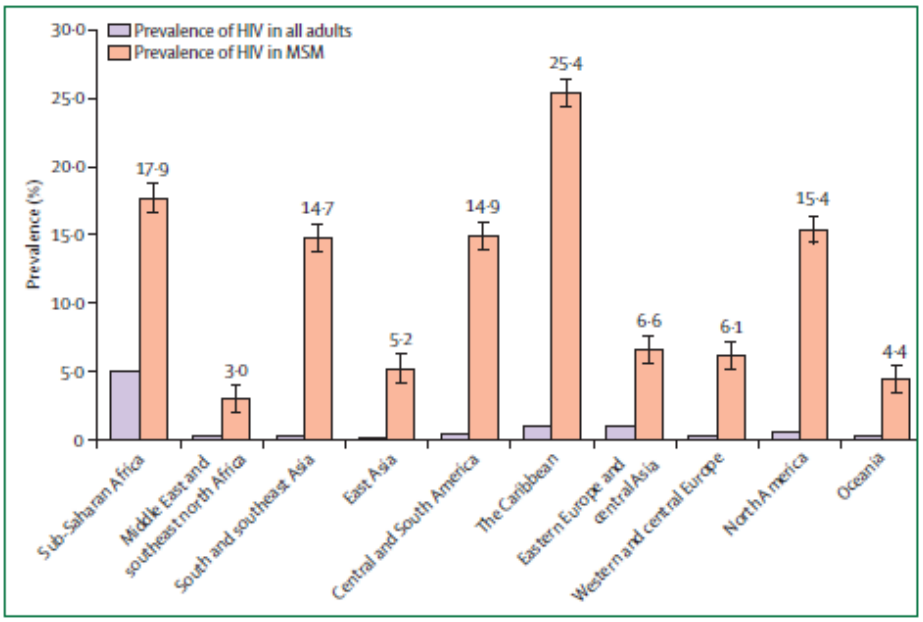

Figure 1: Global prevalence of HIV in MSM compared with regional adult prevalence reported by UNAIDS, 2010 (Beyrer et al., 2012)

The HIV/AIDS epidemic among MSM in the U.S. and other developed countries has been well studied. However, the social stigmatization, and in some cases, criminalization, of same-sex sexual behavior in many LMICs limits research on HIV/AIDS among MSM in these settings. Additionally, across all contexts, HIV/AIDS literature often focuses on individual-level risk behaviors. Meanwhile, the role of the socio-demographic factors and social stressors that place MSM at a greater risk for a preponderance of negative health effects (including HIV/AIDS) and the context in which HIV risk behaviors occur remains largely unexplored. In the wake of re-emerging HIV epidemics among MSM worldwide, understanding the complex interplay between social stress, cultural environments, and risk behaviors is of paramount importance in designing effective HIV prevention services.

Objective & Aims:

The objective of this study is to examine the relationships between social stress, social networks, risk perceptions, and sexual risk taking among MSM in seven countries: Australia, Brazil, Canada, South Africa, Thailand, the United Kingdom, and the United States. Included in this objective are several aims:

1. To describe the prevalence of homophobia (internalized homophobia, external homophobic discrimination, and heteronormative social pressures) across seven culturally and economically diverse countries;
2. To identify socio-demographic differences in the individual reporting of homophobia, risk behaviors, and HIV risk perceptions;
3. To examine the role of social networks in the individual reporting of internalized homophobia and experiences of external homophobic discrimination;

4. To examine associations between experiencing homophobia and individual reporting of drug use and intoxicated intercourse;
5. To examine the impact of individual characteristics and sexual risk taking on self-reported HIV risk, seriousness and threat.

Homophobia

Despite worldwide progress in abolishing legislation criminalizing same-sex sexual acts between consenting adults, homosexuality is still criminalized in 78 countries and punishable by death in 5 countries (Itaborahy, 2012). Even in countries with antigay discrimination laws and policies, homophobia remains deeply rooted in structural factors. Nearly every religion condemns homosexuality, cultural expressions of masculinity are often highly valued, and social expectations to fulfill rigid gender norms are engrained in everyday life.

For the purpose of this study, we examine the following three domains of homophobia:

1. *External homophobic discrimination*, defined as any experience of antigay prejudice, rejection, discrimination, violence, or threat of violence.
2. *Internalized homophobia*, defined as "the direction of societal negative attitudes toward the self" (Meyer, 1995).
3. *Heteronormative social pressure*, or heteronormativity, defined as the institutionalization of structures, values, beliefs, and practices that define heterosexuality as normative and homosexuality as deviant (Jackson, 2006).

The physical and mental health repercussions of homophobic discrimination, stigmatization, and criminalization are enormous. "*Much of the stigma of AIDS is due to its association with marginalised groups and behaviours (homosexuality, sex work, injecting drug use). This association makes the development of effective programmes to reach those most affected more difficult*" (Altman et al., 2012). Homophobia increases vulnerability to HIV infection by driving discussions of homosexuality and MSM behavior underground, denying or compromising access

to preventative services, and by further marginalizing MSM, which in turn inhibits them from adopting safer health behaviors (Altman et al., 2012). In fact, it is estimated that less than 10% of MSM worldwide have access to basic HIV prevention interventions (Beyrer et al., 2011).

Social Stress

Homophobic environments are thought to contribute not only to MSM's vulnerability to HIV/AIDS, but also to an array of negative mental health outcomes. Experiences of homophobic stigmatization are often associated with increased psychological disorders (D'Augelli, Grossman, & Starks, 2006; Herek, 2009; Herek, Gillis, Cogan, & Glunt, 1997) and suicidal ideation (Huebner, Rebchook, & Kegeles, 2004). Overall, MSM experience significantly higher levels of psychiatric illness than their heterosexual counterparts (Cochran & Mays, 2000a; Cochran, Mays, & Sullivan, 2003; Fergusson, Horwood, Ridder, & Beautrais, 2005; Gilman et al., 2001; Meyer, 2003), particularly depression (Cochran & Mays, 2000b; Cochran et al., 2003; Fergusson et al., 2005), anxiety (Fergusson et al., 2005; Gilman et al., 2001; Meyer, 2003), panic disorders (Cochran & Mays, 2000b; Cochran et al., 2003), mood disorders (Gilman et al., 2001; Meyer, 2003), and substance disorders (Fergusson et al., 2005; Gilman et al., 2001; Meyer, 2003), and are more likely to be comorbid for two or more psychological disorders (Cochran et al., 2003). Additionally, evidence suggests that MSM experience suicidal plans and attempts at higher rates than do heterosexual men (Cochran & Mays, 2000a; Gilman et al., 2001).

Furthermore, there is a wealth of evidence to show that rates of drug (Balan et al., 2012; Folch, Esteve, Zaragoza, Munoz, & Casabona, 2010; Stall & Wiley, 1988) and alcohol use (Balan et al., 2012; Drabble, Midanik, & Trocki, 2005; Stall & Wiley, 1988) among MSM are higher than those of the general population, and research has pointed to the role of social stress, namely external homophobic discrimination and internalized homophobia, in exacerbating rates of substance use among MSM (Folch et al., 2010; Hughes & Eliason, 2002; McKirnan & Peterson, 1988). Additionally, many studies have reported a positive association between drug and alcohol use and sexual risk taking among MSM, namely unprotected anal intercourse (UAI) (Centers for

Disease Control and Prevention, 2012; Dufour et al., 2000). More specifically, studies have shown that drug (Colfax et al., 2004; Ekstrand, Stall, Paul, Osmond, & Coates, 1999; Koblin et al., 2006; Lambert et al., 2011; Purcell, Parsons, Halkitis, Mizuno, & Woods, 2001; Semple, Patterson, & Grant, 2002; Stueve et al., 2002) and alcohol use (Bruce, Kahana, Harper, Fernandez, & The, 2012; Colfax et al., 2004; Ekstrand et al., 1999; Koblin et al., 2006; Lambert et al., 2011; Mimiaga et al., 2011; Purcell et al., 2001) prior to or during intercourse, as well as any drug use in the previous year (Colfax et al., 2004; Ekstrand et al., 1999; Koblin et al., 2003) were significantly associated with engaging in UAI with a partner of unknown or discordant HIV status, a known risk behavior for HIV transmission (Centers for Disease Control and Prevention, 2012).

Social Networks

The impact of social networks on experiencing social stress and on risk taking behaviors is complex, and the directionality and magnitude of these associations are varied in the literature. Some research suggests that the presence of a social network of other MSM may be a mediating factor for withstanding stressful experiences (Frost & Meyer, 2009, 2012; Meyer, 2003) because it allows MSM to make positive comparisons to similar people, rather than reflecting the negative stigma of the heterosexist majority (Meyer, 2003). However, other literature suggests that having a larger social network of MSM provides more opportunities to socialize in gay/MSM bars and clubs, venues which alcohol and drug use is promoted and normalized and MSM are exposed to negative role models and influences (Greenwood et al., 2001; McKirnan & Peterson, 1989; Rosario, Schrimshaw, & Hunter, 2004; Stall et al., 2001). Moreover, while some studies demonstrate the positive effects of community connectedness on the mental health (Kertzner, Meyer, Frost, & Stirratt, 2009) and sexual risk taking (Ramirez-Valles & Brown, 2003) of MSM, other literature suggests that gay men are more likely to partake in high-risk behaviors if their social network contains perceived or actual greater sexual risk taking (Peterson, Rothenberg, Kraft, Beeker, & Trotter, 2009; Smith, Grierson, Wain, Pitts, & Pattison, 2004).

In order to gain a better understanding of the HIV/AIDS epidemic among MSM, the current study attempts contextualize the social, cultural, and environmental factors in which HIV risk behaviors occur. Using a samples of MSM from 7 countries- Australia, Brazil, Canada, South Africa, Thailand, the United Kingdom, and the United States, this research explores variations in external and internal homophobic experiences; measures the prevalence of drug use and intoxicated intercourse, and contextualizes these behaviors in a social stress framework; and quantifies perceptions of HIV risk, seriousness, and threat in relation to sexual risk taking. This study is the first cross-national examination of each of these domains, and aims to draw attention to the confluence of complex factors which must be incorporated into prevention efforts to effectively reverse the HIV epidemic among MSM worldwide.

Chapter II: Manuscript I

Sexual Behaviors, Social Networks, and Homophobia among MSM in Seven Countries

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Sexual Behaviors, Social Networks, and Homophobia among MSM in Seven Countries

Abstract

Experiences of homophobic discrimination are associated with an increased prevalence of psychological disorders and increased odds of reporting suicidal ideation among men who have sex with men (MSM). We examine two domains of homophobia – external homophobic discrimination and internalized homophobia – and their associations with socio-demographic characteristics, sexual behaviors, and social networks among a sample of MSM in 7 countries.

Sexually active MSM aged over 18 and residing in Australia, Brazil, Canada, South Africa, Thailand, the United Kingdom, and the United States were recruited through Facebook. Two outcomes were examined: reporting experiences of homophobic discrimination (index scale zero-11) and reporting feelings of internalized homophobia (index scale zero-80). The mean number of reported episodes of external homophobic discrimination ranged from 4.12 (Thailand) to 5.90 (South Africa), and reported feelings of internalized homophobia ranged from 13.31 (UK) to 27.48 (Thailand). Older MSM and MSM with younger ages of sexual debut reported significantly more experiences of external homophobic discrimination, while MSM with a main partner and having a larger gay social network reported significantly fewer feelings of internalized homophobia. Aside from age, no socio-demographic characteristics were significantly associated with either external or internalized homophobia.

Results demonstrate the far-reaching effects of homophobia, the ameliorative effect of social networks on experiencing homophobia, and highlight the need for inclusion of homophobia as a physical and mental health risk factor. Additional research should focus on incorporating experiences of homophobia in HIV/AIDS and STI counseling and testing tools.

Background

There is a wealth of evidence illustrating the continued stigmatization faced by men who have sex with men (MSM) in both the U.S. and in many parts of the world [1]. Expressions of such stigma are varied, spanning from persecution, bullying, and discrimination, to state-sanctioned criminalization of male to male sexual contact [1]. Although the 1969 U.S. Federal Hate Crime Law criminalized acts of violence due to real or perceived race, religion, or nationality [2], crimes motivated by sexual orientation were not included until 2009, when Congress passed the Matthew Shepard and James Byrd, Jr. Hate Crimes Prevention Act [3]. Regardless of this law, a plethora of research has shown that the prevalence of hate crime victimization against sexual minorities is widespread, estimating that more than 50% of men who have sex with men (MSM) in the U.S. have experienced some form of anti-gay hate crime [4-9]. Expressions of this victimization ranges from physical [4-9], sexual [5-9], and verbal [4-9] assault, to property crimes [4-6, 8, 9] and threats of violence [4, 6, 8, 9]. Outside of the U.S., only 18 countries worldwide consider hate crimes based on sexual orientation an aggravating circumstance (not included are 4 of our study countries- Australia, Brazil, South Africa, and Thailand) [10], just 6 countries have constitutional protections against discrimination based on sexual orientation [10](not included are 5 of our study countries- Australia, Canada, Thailand, UK, U.S.), and only 52 countries prohibit employment discrimination based on sexual orientation (Thailand is the only of our study countries that does not extend this protection) [10]. Additionally, homosexual acts are illegal in 78 countries [10] and punishable by death in 5 countries [10]. Despite what is known about the varied laws and policies around homosexuality globally, there is a dearth of studies that have examined how these environments lead to levels of perceived or actual homophobia among MSM globally.

The resonating effects of these homophobic environments may be demonstrated by the high levels of negative mental health outcomes experienced by many MSM. Experiences of homophobic stigmatization are often associated with increased psychological disorders [5, 7, 11]

as well as increased odds of reporting suicidal ideation [12]. In fact, recent research suggests that, overall, MSM experience significantly higher levels of psychiatric illness than their heterosexual counterparts [13-17], namely depression [13, 17, 18], anxiety [14, 16, 17], panic disorders [13, 18], mood disorders [14, 16], substance disorders [14, 16, 17], and to be comorbid for two or more psychological disorders [13]. Additionally, evidence suggests that MSM experience suicidal plans and attempts at higher rates than do heterosexual men [14, 15].

One framework commonly used to explain the preponderance of psychological morbidity among MSM is the minority stress model [16, 19-25]. The theory of minority stress posits that MSM living in a heterosexist society are sexual minorities; consequently, they are prone to chronic stress resulting from stigmatization surrounding their sexual identities [16, 19]. Minority stressors manifest themselves in three forms: internalized homophobia, defined as *"the direction of societal negative attitudes toward the self"*[19]; perceived stigma, which refers to expectations of discrimination, stigmatization, and/or violence; and actual experiences of discriminatory and/or violent events [16, 19]. Numerous studies have supported the minority stress model by demonstrating that internalized homophobia, perceived stigma, and experiences of discrimination are all independent risk factors for psychological distress [16, 19, 23, 25] and suicidal ideation [22] among MSM in the U.S. Furthermore, minority stress has also been linked to negative health behaviors among MSM. For example, Hamilton et al (2009) found that higher levels of minority stress among MSM were significantly associated with increased perceptions of health risk behaviors, such as drug use and unprotected anal intercourse (UAI), as normative. Additionally, Hatzenbuehler et al (2008) found significant associations between minority stress on HIV risk behavior, substance use, and depressive symptoms, where respondents with higher levels of internalized homophobia were significantly more likely to engage in unprotected anal intercourse (UAI) and have more sexual partners than respondents with lower levels of internalized homophobia, and respondents experiencing more episodes of external homophobia were significantly more likely to report substance use.

MSM and other members of the lesbian, gay, bisexual, and transgender (LGBT) community employ a number of personal coping mechanisms to ameliorate the effects of minority stress [16]. Included among these is the presence of a social network of other minority members, which may be a mediating factor for withstanding stressful experiences [16, 23, 27]. Having a connection with members of one's sexual minority allows an individual to make positive comparisons to similar people, rather than reflecting the negative stigma of the heterosexist majority [16]. Some studies have demonstrated the positive effects of community connectedness on the mental health [24] and sexual risk taking [28] of MSM, but this association remains largely unexplored and confined to MSM in the United States.

Despite the abundance of studies investigating the prevalence of homophobic discrimination and the mental health effects of such victimization in the U.S, few studies have examined experiences of homophobic discrimination in international settings, particularly in low- and middle- income countries (LMICs). Moreover, little research has attempted to identify socio-demographic correlates of external homophobic discrimination or internalized homophobia. This research aims to fill the gap in the literature by investigating cross-national experiences of both internal and external homophobic discrimination, as well as endeavoring to identify risk factors for experiencing such internal and external homophobic discrimination. Aside from the harmful psychical and mental effects of homophobic discrimination on MSM, the stigmatization of homosexuality also serves to create an environment in which the provision of health services and access to resources for MSM is oppressed [1]. Given that worldwide, MSM are disproportionately affected by HIV/AIDS [29], this research investigating the cross-national predictors of homophobic experiences is of paramount importance.

Methods

Participants were recruited for a self-administered survey via Facebook. Over a 5-14 day (dependent on country) period, banner ads were placed on Facebook, targeted to men who indicated an interest in men on their profiles and reported residency in Australia, Brazil, Canada, South Africa, Thailand, the United Kingdom (UK) or the United States (U.S.). Clicking on the advertisement led potential participants to information regarding the survey; after obtaining electronic informed consent, participants were invited to complete the survey. Being born male, being over 18 years of age, and self-reporting having had sex with a man in the previous year were requirements for eligibility. Except for the Brazilian and Thai surveys, which were conducted in Portuguese and Thai, respectively, all surveys were conducted in English.

A total of 11,850 people in the seven sample countries clicked on the advertisement and were subsequently exposed to the survey. Of these, 6,874 people began the survey. 1,551 (22.6%) did not meet eligibility criteria and were disqualified from completion. 2,021 men (29.4%) began but did not finish the survey, and 3,302 (48.0%) completed the survey. Of the men who completed the survey, 2,984 (90.4%) provided data for all covariates of interest and were included in the current analysis.

The survey collected information on the participants' demographic and socio-economic characteristics (e.g. age, race/ancestry, level of education, and employment status), in addition to data on respondents' age of sexual debut, relationship status, and recent sexual behavior. Age of sexual debut was self-reported as the age which the respondent first had sex with either a man or a woman. Relationship status was determined by asking respondents if they were in a sexual relationship (*"Are you currently in a sexual relationship?"*). In order to measure behavioral bisexuality, respondents were asked whether they had ever had sex with a woman in their lifetime (*"Approximately how many women have you had vaginal or anal sex with in your lifetime?"*). Respondents were asked how many gay friends or acquaintances they had, as a measure of the extent of their social networks and access to the gay community (*"Approximately how many people do you know that identify themselves as a gay or bisexual man?"*).

The analysis examines the extent to which demographics, socio-economic characteristics, and social networks are associated with experiences of homophobic discrimination. To measure homophobic discrimination, participants were asked a series of questions to measure their experiences of both external and internalized homophobia. To measure experiences of external homophobic discrimination, a battery of 11 questions regarding types of homophobic discrimination (e.g. *"Due to your sexual orientation were you ever made fun of as a child?")* was included. Affirmative responses were assigned one point, creating a hypothetical score range of zero to 11, where a higher score represented greater experiences of homophobic discrimination. Internalized homophobia was assessed using a 20-item subset of the Gay Identity Scale, a validated tool which measures the degree of acceptance of homosexual behaviors, thoughts, and feelings [30]. Responses affirming internally homophobic attitudes (e.g. *"I dread having to deal with the fact that I may be homosexual"*) were assigned positive point values, responses indicating gay pride (e.g.*"I am very proud to be gay and make it known to everyone around me"*) were assigned negative point values, and neutral responses were assigned no points. The scale ranged from zero to 80, where a higher score represented a lower acceptance of respondents' homosexual behaviors, thoughts, and feelings, and decreased gay pride. These series of questions provide the two outcomes for analysis, two continuous variables measuring 1) external homophobic discrimination and 2) internalized homophobic discrimination.

Data were analyzed using STATA 12 [31]. Two separate linear regression models were fitted for each of the two outcomes in each of the 7 countries. Key covariates for analysis included: age (categorized as 18-24, 25-34, 35-44, and ≥45, except for Brazil and Thailand, which were categorized as 18-24, 25-34, and ≥35 due to a small number of respondents aged ≥45), education (dichotomized as receiving a secondary school education or less (≤12 years) or receiving higher education (>12 years)), and race/ancestry (White/European, Aboriginal, Other (Australia); White, Other (Canada, UK, U.S.); White, Mixed, Other (Brazil); White, Black, Other (South Africa); and Thai, Other (Thailand)). Age of sexual debut was categorized into 3 groups:

≤15 years, 16-20 years, >20 years. Relationship status was defined as being in a relationship with a man versus no relationship; respondents reporting a relationship with a woman were classified as not being in a relationship. Behavioral bisexuality was a binary variable, classified as behaviorally bisexual versus not behaviorally bisexual. The number of gay friends in respondents' social network were grouped into categories of zero friends, ≤10 friends, 11-20 friends, and >20 friends. Key covariates of interest in both models were age of sexual debut, behavioral bisexuality, and the size of the participant's social network.

Results

Demographic characteristics of the sample and mean index scores for experiences of external homophobic discrimination and internalized homophobia are summarized by country in Table 1. In all countries, the majority of the sample was between the ages of 18 and 24 (except South Africa and Thailand), with >12 years of education, of White/European/Thai race/ancestry, and employed. Additionally, the age of sexual debut for the majority of respondents in all countries (except Brazil) was between 16-20 years and most respondents had ≥21 gay friends in their social networks (except Thailand).

There were some variations between the countries regarding experiences of external homophobic discrimination and internalized homophobia. The mean number of episodes of external homophobic discrimination ranged from 4.12 (SD: 0.10) in Thailand to 5.90 (SD: 0.11) in South Africa. The mean internalized homophobia index score ranged from 13.31 (SD: 0.55) in the UK to 27.48 (SD: 0.59) in Thailand. Reporting of external homophobic discrimination and internalized homophobia varied differently by covariates and by country (Table 2).

Few covariates were significantly associated with external homophobic discrimination (Table 3). Compared to respondents aged 18-24, Australian men aged 35-44, Brazilian men aged 25-34 and 35-44, and British men aged 25-34, 35-44, and >45 reported significantly more experiences of external homophobic discrimination. Respondents with an older age of sexual

debut reported significantly fewer experiences of external homophobic discrimination in South Africa (>20 years) and the UK (16-19 years) compared with respondents whose age of sexual debut was ≤15. Lastly, compared to men reporting having no gay friends or acquaintances in their social networks, Australian men with >20 gay friends and Canadian men with 11-20 and >20 gay friends reported significantly more experiences of external homophobic discrimination.

More covariates were significantly associated with reporting internalized homophobia (Table 3). Three covariates were significant in only one country: in South Africa, respondents >45 years of age and employed respondents exhibited significantly lower internalized homophobia scores, whereas respondents with a lifetime history of behavioral bisexuality had significantly higher internalized homophobia scores. In the U.S. and UK, men of a non-White race had significantly higher internalized homophobia scores than White men. Increasing age of sexual debut was correlated with significantly higher internalized homophobia scores in Australia (16-19 years and >20 years) and the UK (>20 years). Having a main partner was protective against internalized homophobia in Canada, the UK, and the U.S., where respondents who reported having a main partner had significantly lower internalized homophobia scores. The number of gay friends in the respondent's social network was significantly associated with internalized homophobia in all countries except the UK. In each country, men reporting having any gay friends or acquaintances in their social networks reported significantly higher internalized homophobia scores. Moreover, there was an inverse relationship between the number of gay friends in a respondent's social network and his feelings of internalized homophobia; respondents' internalized homophobia scores decreased as they reported more gay friends and/or acquaintances in their social networks.

Discussion

Although the body of research demonstrating the negative effects of homophobia on the mental health of MSM in the U.S. is growing [5-8, 11-16, 18], literature showing effects of

homophobia on health outcomes in international settings remains at a nascent stage [17]. In particular, there is a dearth of research that has examined associations between social network characteristics and homophobic experiences among MSM in any setting. The results of the current study point to the role of social networks in shaping individual reporting of internalized homophobia among MSM in seven culturally and economically diverse settings.

Our finding that being in a sexual relationship is associated with a lower reporting of feelings of internalized homophobia corroborates previous research demonstrating the association between intimate relationships and internalized homophobia [32-34]. In our bivariate analysis, we found that in 6 of our 7 sample countries (all countries except for Thailand), feelings of internalized homophobia were significantly higher among single respondents than respondents reporting being in a relationship. The association between relationship status and internalized homophobia remained significant in 3 of these countries (Canada, UK, and U.S.) in the multivariate analysis. Frost and Meyer (2009) suggest that internalized homophobia as a minority stressor can lead to intimacy problems among MSM because of the unsubstantiated perception that MSM are incapable of maintaining committed, substantial, and healthy relationships. Hence, internalized homophobia may be higher among single respondents either because these feelings act as a barrier to relationship formation, or not being in a relationship currently acts to heighten negative feelings towards their sexual orientation. In contrast, relationships may provide both social and emotional support for the chronic stress experienced by sexual minorities, and other studies have shown relationships to be protective against harmful behaviors such as drug use [35], and frequent/heavy alcohol use [36].

Having a larger social network of gay friends and acquaintances was significantly associated with fewer feelings of internalized homophobia in all countries but the UK. Social networks provide a support system of other MSM experiencing similar stigmatizations and prejudices. This creates an outlet for MSM to voice their feelings, questions, and concerns with others who are more equipped to empathize with their experience as a MSM, in an environment

safe from stigma and discrimination. Additionally, having a social network links MSM to positive role models, and allows them to make positive comparisons to similar men facing similar experiences. Furthermore, social networks may also encourage outness and participation in gay-related events and culture, from which MSM may draw social support and build positive sexual identities. The confluence of these effects not only helps to reduce feelings of internalized homophobia, but also increases access to physical and mental health services specifically designed for and tailored to MSM. Our finding is concurrent with previous literature suggesting that the social support provided by social networks helps to ameliorate the negative mental health effects of minority stressors [16, 23, 24, 27]. In particular, Frost and Meyer (2009 and 2012) found that internalized homophobia was significantly lower among LGBT with greater community connectedness. However, other literature has pointed to negative effects of social networks on MSM behaviors. For example, several studies have suggested that drug and alcohol use are higher among MSM with greater social involvement in the gay community [35, 37, 38], and that gay men whose social networks contain individuals with perceived or actual greater sexual risk-taking are themselves more likely to partake in high-risk behaviors [39, 40].

Older age was significantly associated with reporting more episodes of external homophobic discrimination in Australia, Brazil, and the United Kingdom. Conversely, an older age of sexual debut was significantly associated with fewer episodes of external homophobic discrimination in South Africa and in the United Kingdom. Given that experiencing external homophobic discrimination was measured as an accumulation of *lifetime* episodes of stigmatization, this association is unsurprising: older men have had more opportunities to experience homophobia. Similarly, if respondents' age of sexual debut is viewed as a proxy for "outness," having an older age of sexual debut would plausibly serve to delay experiencing external homophobic discrimination.

Aside from age, the only other demographic variable significantly associated with experiencing homophobia was race. MSM of non-White races in the United Kingdom and in the

United States reported significantly more feelings of internalized homophobia. This finding may be explained by the hypothesis of additive minority stress, which suggests that MSM of minority races face a double burden of stress from being both a racial/ethnic minority and a sexual minority [22, 24, 25]. However, this hypothesis remains largely unsubstantiated and unexplored due to limited research on the topic. For example, in their sample of Black, White, and Latino LGBT respondents, Kertzner et al. (2009) found no evidence of additive minority stress between Black and White respondents, but found increased levels of depressive symptoms among Latino respondents compared to White respondents. Diaz et al. (2001) also found evidence of additive minority stress among a sample of Latino MSM in the U.S, and Meyer et al. (2008) found that both Black and Latino MSM experienced an added burden of stress and prejudicial events compared to White heterosexuals and White MSM. However, existing research investigating additive minority stress has been confined to Black, White, and Latino MSM in the United States. Our results indicate that additive minority stress of being both a racial minority and a sexual minority may also exist in settings outside the United States, and investigating this hypothesis in international settings would be a valuable contribution to current research.

There are several important limitations to the present study, most of which result from its internet-based sampling design. In all countries, the survey was advertised only to MSM who were registered users of Facebook and had a profile indicating an interest in men. Consequently, MSM who are more open about their sexuality may be oversampled. Such bias could possibly lead to an over-reporting of experiencing external homophobic discrimination and underreporting of internalized homophobia, our two study outcomes. Furthermore, a significant proportion of those who clicked on the banner ads did not complete the survey: we do not have data on their characteristics to establish the extent of this selectivity bias. Previous studies suggest that MSM who participate in research are generally non-representative of the larger MSM community; they tend to be better educated, more open about their sexualities, and more likely to be white [41]. These characteristics are certainly reflected in our sample. Lastly, because of the cross-sectional

survey design, we cannot make causal inferences between our covariates and outcomes. Despite these limitations, however, this study demonstrated the usefulness of an internet-based survey tool in reaching traditionally hard-to-reach populations, and for collecting standardized data across economically and culturally diverse settings.

Conclusion

The results from this study suggest that experiences of homophobic discrimination and feelings of internalized homophobia among MSM are largely independent of demographic and socio-economic characteristics. Rather, the social environment in which MSM exist is significantly associated with experiencing homophobia. Given that the current study was conducted across seven economically and culturally different countries, our finding that MSM in sexual relationships and MSM with larger social networks of gay friends report significantly less internalized homophobia suggests that social networks may a universal mediator of internalized homophobia as a minority stressor. The implications of these results are resounding; because MSM face barriers accessing health services due to homophobic stigma and marginalization [1], expanding social networks for MSM could be an effective pathway to improving access to healthcare.

Table 1: Background Demographic Characteristics by Country							
Variable	**Australia[§] (n=384)**	**Brazil[ŧ] (n=492)**	**Canada (n=387)**	**South Africa[¥] (n=470)**	**Thailand* (n=465)**	**UK (n=414)**	**US (n=372)**
Age							
18-24 years	52.1%	64.4%	39.5%	26.2%	36.8%	49.8%	55.4%
25-34 years	22.7%	25.4%	24.6%	35.5%	43.4%	23.9%	16.1%
35-44 years	14.1%	6.5%	14.2%	21.1%	16.8%	12.8%	9.4%
≥45 years	11.2%	3.7%	21.7%	17.2%	3.0%	13.5%	19.1%
Education							
≤ 12 years	38.3%	37.0%	25.3%	32.8%	21.9%	21.5%	32.5%
> 12 years	61.7%	63.0%	74.7%	67.2%	78.1%	78.5%	67.5%
Race							
European[§]/White/Thai*	58.3%	57.3%	80.9%	83.1%	96.1%	94.7%	80.7%
Aboriginal[§]/Mixed[ŧ] /Black[¥]	33.3%	28.1%	--	9.2%	--	--	--
Other	8.3%	14.6%	19.1%	7.7%	3.9%	5.3%	19.4%
Employment							
Unemployed	23.7%	30.9%	27.2%	19.8%	27.1%	32.6%	38.2%
Employed	76.3%	69.1%	72.8%	80.2%	72.9%	67.4%	67.2%
Age of Sexual Debut							
≤15 years	31.3%	57.1%	35.9%	39.4%	39.4%	41.8%	35.8%
16-20 years	53.9%	36.2%	48.1%	39.6%	39.6%	47.8%	51.6%
>20 years	14.8%	6.7%	16.0%	21.1%	21.1%	10.4%	12.6%
Relationship Status							
Single	50.4%	53.7%	42.9%	43.6%	50.5%	47.6%	50.3%
In a relationship	49.5%	46.3%	57.1%	56.4%	49.5%	52.4%	49.7%
Behavioral Bisexuality in Lifetime							
No	59.0%	62.2%	57.6%	57.0%	80.2%	59.9%	62.4%
Yes	41.0%	37.8%	42.4%	43.0%	19.8%	40.1%	37.6%
Number of Gay Friends in Social Network							
0 friends	1.6%	1.2%	2.1%	2.6%	8.8%	1.0%	3.0%
≤10 friends	32.8%	19.1%	27.9%	17.0%	42.4%	30.4%	28.2%
11-20 friends	22.1%	18.9%	18.9%	21.7%	20.9%	24.9%	21.0%
≥21 friends	43.5%	60.8%	51.2%	58.7%	28.0%	43.7%	47.9%
Scale Indices Scores (mean/sd)							
Experiences of External Homophobic Discrimination	5.16 (2.37)	5.64 (0.10)	5.19 (0.13)	5.90 (0.11)	4.12 (0.10)	4.85 (0.11)	5.33 (0.14)
Internalized Homophobia	16.48 (12.43)	17.49 (0.54)	15.47 (0.65)	13.54 (0.51)	27.48 (0.59)	13.31 (0.55)	13.53 (0.59)

Table 2: Experiences of External Homophobic Discrimination							
Variable	**Australia[§]**	**Brazil[ŧ]**	**Canada**	**South Africa[¥]**	**Thailand***	**UK**	**US**
Age							
18-24 years	4.95 (2.11)	***5.40 (2.00)***	4.84 (2.47)	5.98 (1.99)	***4.08 (1.93)***	***4.44 (2.04)***	5.20 (2.45)
25-34 years	5.09 (2.36)	***5.90 (2.13)***	5.09 (2.41)	6.02 (2.32)	***4.03 (2.07)***	***4.96 (2.28)***	5.18 (2.45)
35-44 years	5.67 (2.82)	***6.78 (2.43)***	5.49 (2.50)	5.93 (2.33)	***4.62 (2.21)***	***5.58 (2.54)***	6.26 (2.76)
> 45 years	5.65 (2.88)	***6.06 (2.69)***	5.73 (2.68)	5.51 (2.73)	***3.07 (2.81)***	***5.43 (2.23)***	5.35 (3.07)
Education							
≤ 12 years	5.14 (2.40)	5.41 (1.89)	5.53 (2.75)	5.94 (2.34)	4.17 (2.42)	5.13 (2.39)	4.98 (2.56)
> 12 years	5.18 (2.37)	5.78 (2.23)	5.08 (2.43)	5.88 (2.31)	4.11 (1.98)	4.77 (2.18)	5.49 (2.63)
Race							
European[§]/White/Thai*	5.30 (2.44)	***5.73 (2.16)***	5.12 (2.54)	5.88 (2.40)	4.13 (2.06)	4.85 (2.23)	5.29 (2.60)
Aboriginal[§]/Mixed[ŧ] /Black[¥]	4.92 (2.30)	***5.39 (1.84)***	--	5.88 (1.66)	--	--	--
Other	5.19 (2.21)	***5.78 (2.43)***	5.49 (2.46)	6.25 (1.99)	3.89 (2.56)	4.82 (2.40)	5.46 (2.69)
Employment							
Unemployed	5.12 (2.48)	5.68 (2.20)	5.25 (2.81)	5.87 (2.21)	3.92 (2.07)	4.85 (2.31)	5.55 (2.93)
Employed	5.18 (2.35)	5.63 (2.08)	5.17 (2.42)	5.91 (2.34)	4.19 (2.09)	4.84 (2.20)	5.22 (2.45)
Age of Sexual Debut							
≤ 15 years	5.55 (2.53)	5.66 (2.22)	***5.68 (2.73)***	***6.21 (2.19)***	4.30 (2.26)	***5.24 (2.31)***	5.62 (2.84)
16-19 years	5.03 (2.29)	5.65 (1.93)	***4.98 (2.47)***	***5.90 (2.33)***	4.02 (1.93)	***4.55 (2.12)***	5.24 (2.52)
> 20 years	4.84 (2.31)	5.52 (2.27)	***4.74 (1.98)***	***5.33 (2.45)***	3.97 (2.00)	***4.65 (2.22)***	4.83 (2.26)
Relationship Status							
Single	5.24 (2.40)	5.68 (2.12)	5.23 (2.59)	5.98 (2.36)	4.20 (1.91)	4.61 (2.20)	5.10 (2.62)
In a relationship	5.08 (2.36)	5.60 (2.12)	5.16 (2.48)	5.85 (2.29)	4.04 (2.25)	5.06 (2.25)	5.55 (2.61)
Behavioral Bisexuality in Lifetime							
No	5.06 (2.41	5.59 (1.96)	***4.91 (2.44)***	5.76 (0.13)	4.09 (2.03)	***4.67 (2.13)***	5.19 (2.47)
Yes	5.33 (2.33)	5.73 (2.35)	***5.58 (2.59)***	6.09 (0.13)	4.23 (2.31)	***5.11 (2.36)***	5.54 (2.84)
Number of Gay Friends in Social Network							
0 friends	3.67 (1.37)	4.67 (3.44)	***3.38 (1.77)***	5.75 (1.66)	3.98 (1.99)	3.75 (0.96)	4.36 (2.77)
≤10 friends	4.86 (2.28)	5.29 (1.96)	***4.79 (2.54)***	5.53 (2.27)	4.13 (2.05)	4.58 (2.23)	4.93 (2.66)
11-20 friends	5.21 (2.59)	5.49 (1.98)	***5.26 (2.17)***	5.71 (2.16)	4.32 (1.99)	4.87 (2.22)	5.31 (2.63)
≥21 friends	5.42 (2.33)	5.82 (2.17)	***5.46 (2.62)***	6.09 (2.40)	4.01 (2.23)	5.04 (2.24)	5.62 (2.56)

Table 2, continued: Internalized Homophobia							
Variable	**Australia[§]**	**Brazil[ŧ]**	**Canada**	**South Africa[¥]**	**Thailand***	**UK**	**US**
Age							
18-24 years	17.20 (12.59)	17.93 (11.92)	16.52 (12.49)	***16.54 (13.07)***	26.06 (12.12)	14.66 (11.34)	12.89 (10.35)
25-34 years	16.46 (12.81)	17.14 (12.18)	15.32 (13.32)	***12.83 (9.07)***	27.92 (12.83)	11.49 (9.76)	13.63 (13.62)
35-44 years	13.41 (10.25)	15.34 (12.80)	14.38 (12.76)	***10.91 (9.03)***	28.63 (13.29)	11.98 (11.65)	14.69 (12.84)
> 45 years	17.02 (13.14)	15.89 (10.42)	14.44 (12.90)	***13.68 (12.52)***	31.36 (12.51)	12.80 (11.77)	14.76 (11.12)
Education							
≤ 12 years	16.61 (12.44)	18.69 (12.74)	***18.10 (15.52)***	12.72 (11.08)	26.52 (12.89)	11.51 (10.28)	12.57 (9.93)
> 12 years	16.39 (12.44)	16.78 (11.47)	***14.58 (11.65)***	13.94 (10.98)	27.75 (12.61)	13.80 (11.32)	14.00 (11.91)
Race							
European[§]/White/Thai*	15.45 (11.98)	17.20 (12.09)	***14.42 (12.25)***	***13.06 (10.73)***	27.57 (12.65)	***12.81 (10.44)***	***12.88 (10.50)***
Aboriginal[§]/Mixed[ŧ] /Black[¥]	17.46 (13.05)	17.30 (11.82)	--	***17.51 (13.12)***	--	--	--
Other	19.75 (12.47)	18.96 (11.91)	***19.89 (14.22)***	***14.33(10.11)***	25.28 (13.31)	***22.23 (17.90)***	***16.26 (13.94)***
Employment							
Unemployed	***19.20 (13.52)***	19.03 (13.30)	***17.74 (14.31)***	***16.87 (11.43)***	27.14 (11.94)	***15.33 (13.29)***	13.11 (10.13)
Employed	***15.63 (11.96)***	16.80 (11.29)	***14.66 (12.13)***	***12.72 (10.77)***	27.60 (12.94)	***12.33 (9.80)***	13.74 (11.85)
Age of Sexual Debut							
≤ 15 years	***13.95 (11.55)***	17.89 (12.41)	16.57 (13.93)	12.76 (10.28)	27.66 (12.28)	***12.40 (11.07)***	13.51 (10.99)
16-19 years	***17.28 (12.90)***	16.75 (11.03)	15.47 (12.42)	13.45 (10.97)	26.77 (12.59)	***12.74 (10.07)***	13.19 (11.64)
> 20 years	***18.89 (11.74)***	17.94 (13.26)	13.02 (11.07)	15.18 (12.30)	28.48 (13.55)	***19.56 (14.02)***	15.00 (10.91)
Relationship Status							
Single	***18.16 (13.50)***	***18.62 (12.27)***	***17.37 (14.24)***	***15.14 (12.21)***	27.04 (12.36)	***15.03 (12.16)***	***14.97 (12.33)***
In a relationship	***14.75 (10.99)***	***16.18 (11.51)***	***14.04 (11.45)***	***12.30 (9.84)***	27.92 (12.98)	***11.75 (9.88)***	***12.09 (10.00)***
Behavioral Bisexuality in Lifetime							
No	16.32 (12.38)	17.88 (12.18)	14.68 (11.84)	13.78 (10.37)	***26.08 (11.81)***	13.32 (11.17)	12.83 (10.51)
Yes	16.61 (12.36)	16.84 (11.64)	16.55 (13.99)	13.22 (11.84)	***33.16 (14.39)***	13.30 (11.11)	14.71 (12.46)
Number of Gay Friends in Social Network							
0 friends	***30.00 (19.61)***	***41.67 (12.40)***	***28.25 (22.27)***	***23.08 (16.03)***	***36.63 (13.49)***	***7.50 (8.10)***	***23.27 (20.12)***
≤10 friends	***21.01 (13.70)***	***19.33 (12.50)***	***17.84 (13.33)***	***18.95 (14.53)***	***29.61 (12.54)***	***18.45 (13.37)***	***14.12 (12.02)***
11-20 friends	***16.39 (11.98)***	***17.59 (11.23)***	***18.70 (14.77)***	***14.13 (11.12)***	***25.22 (11.09)***	***12.95 (9.26)***	***13.88 (10.67)***
≥21 friends	***12.62 (9.67)***	***16.39 (11.49)***	***12.47 (0.25)***	***11.34 (9.00)***	***23.04 (11.52)***	***10.06 (8.98)***	***12.43 (10.16)***

Table 3: Experiences of External Homophobic Discrimination							
Variable	**Australia[§]**	**Brazil[†]**	**Canada**	**South Africa**	**Thailand***	**United Kingdom**	**United States**
Age (ref: 18-24 years)							
25-34 years	0.14 (-0.49, 0.76)	***0.54 (0.09, 0.99)***	0.13 (-0.56, 0.82)	0.02 (-0.56, 0.60)	-0.13 (-0.62, 0.36)	***0.58 (0.02, 1.13)***	-0.07 (-0.88, 0.74)
35-44 years	***0.85 (0.08, 1.61)***	***1.46 (0.66, 2.26)***	-0.43 (-0.43, 1.28)	-0.22 (-0.89, 0.44)	0.41 (-0.22, 1.04)	***0.99 (0.26, 1.73)***	0.88 (-0.10, 1.86)
> 45 years	0.66 (-0.17, 1.49)	0.65 (-0.37, 1.66)	0.42 (-0.39, 1.23)	-0.68 (-1.39, 0.03)	-1.07 (-2.24, 0.11)	***0.82 (0.13, 1.53)***	-0.17 (-0.97, 0.63)
Education (ref: ≤ 12 years)							
> 12 years	0.09 (-0.82, 1.00)	0.17 (-0.22, 0.57)	-0.43 (-1.02, 0.17)	-0.06 (-0.51, 0.40)	-0.09 (-0.57, 0.41)	-0.09 (-0.64, 0.46)	0.45 (-0.13, 1.04)
Race (ref: European[§]/White/Thai*)							
Aboriginal[§]/Mixed[†]	-0.31 (-0.84, 0.21)	-0.28 (-0.71, 0.15)	--	-0.06 (-0.83, 0.71)	--	--	--
Other	0.09 (-0.82, 1.00)	0.15 (-0.40, 0.70)	0.21 (-0.11, 0.54)	0.42 (-0.37, 1.22)	-0.57 (6.28, 5.13)	0.16 (-0.80, 1.13)	0.20 (-0.49, 0.89)
Employment (ref: Unemployed)							
Employed	-0.09 (-0.69, 0.50)	-0.10 (-0.50, 0.31)	-0.09 (-0.67, 0.49)	0.09 (-0.48, 0.67)	-1.04 (-3.81, 1.74)	-0.20 (-0.67, 0.27)	-0.48 (-1.06, 0.10)
Age of Sexual Debut (ref: ≤ 15 years)							
16-19 years	-0.38 (-0.95, 0.18)	0.03 (-0.38, 0.43)	-0.36 (-0.95, 0.23)	-0.27 (-0.75, 0.21)	-0.56 (-3.09, 1.98)	***-0.53 (-1.00, -0.05)***	-0.30 (-0.91, 0.31)
> 20 years	-0.65 (-1.45, 0.16)	-0.38 (-1.15, 0.40)	-0.61 (-1.42, 0.20)	***-0.84 (-1.43, -0.24)***	0.60 (-2.42, 3.61)	-0.62 (-1.39, 0.15)	-0.79 (-1.69, 0.12)
Behavioral Bisexuality in Lifetime (ref: No)							
Yes	-0.05 (-0.59, 0.49)	-0.15 (-0.56, 0.26)	0.33 (-0.26, 0.91)	0.29 (-0.17, 0.75)	0.02 (-0.39, 0.62)	0.02 (-0.45, 0.49)	0.14 (-0.49, 0.77)
Relationship Status (Ref: Single)							
In a relationship	-0.33 (-0.83, 0.17)	-0.22 (-0.60, 0.16)	-0.29 (-0.81, 0.23)	-0.25 (-0.68, 0.18)	-0.22 (-0.60, 0.17)	0.24 (-0.20, 0.68)	0.54 (-0.01, 1.08)
Number of Gay friends in Social Network (ref: 0 gay friends)							
≤10 friends	1.66 (-0.34, 3.65)	0.77 (-0.97, 2.52)	1.57 (-0.24, 3.38)	-0.04 (-1.46, 1.37)	0.21 (-0.50, 0.92)	0.54 (-1.67, 2.75)	0.74 (-0.91, 2.39)
11-20 friends	1.98 (-0.06, 4.02)	1.03 (-0.72, 2.78)	***1.91 (0.05, 3.76)***	0.07 (-1.34, 1.48)	0.40 (-0.37, 1.17)	-0.79 (-1.44, 3.01)	1.11 (-0.58, 2.79)
≥21 friends	***2.11 (0.11, 4.12)***	1.31 (-0.40, 3.03)	***2.12 (0.31, 3.94)***	0.48 (-0.88, 1.83)	0.10 (-0.64, 0.85)	0.79 (-1.41, 3.00)	1.31 (-0.31, 2.92)

Table 3, continued: Feelings of Internalized Homophobia							
Variable	**Australia[§]**	**Brazil[†]**	**Canada**	**South Africa**	**Thailand***	**United Kingdom**	**United States**
Age (ref: 18-24 years)							
25-34 years	0.26 (-2.82, 3.34)	-0.11 (-2.64, 22.43)	1.31 (-2.08, 4.69)	-2.40 (-5.03, 0.23)	1.10 (-1.69, 3.89)	-2.35 (-4.93, 0.24)	0.10 (-3.36, 3.55)
35-44 years	-3.70 (-7.44, 0.03)	-2.08 (-6.54, 2.38)	0.06 (-4.11, 4.23)	-4.30 (-7.32, -1.29)	0.86 (-2.76, 4.47)	-0.25 (-3.68, 3.17)	1.10 (-3.08, 5.27)
> 45 years	-0.25 (-4.31, 3.81)	-1.07 (-6.75, 4.61)	0.14 (-3.81, 4.10)	***-1.33 (-4.53, 1.87)***	3.17 (-3.52, 9.86)	-1.15 (-4.38, 2.09)	2.29 (-1.12, 5.71)
Education (ref: ≤ 12 years)							
> 12 years	-0.50 (-2.97, 1.97)	-1.19 (-3.42, 1.03)	-1.40 (-4.30, 1.51)	0.79 (-1.26, 2.84)	1.83 (-0.98, 4.46)	2.12 (-0.43, 4.67)	1.78 (-0.71, 4.28)
Race (ref: European[§]/White/Thai*)							
Aboriginal[§]/Mixed[†]	1.16 (-1.41, 3.74)	-0.39 (-2.80, 2.03)	--	1.79 (-1.71, 5.28)	--	--	--
Other	3.46 (-0.99, 7.90)	0.48 (-2.61, 3.57)	2.36 (0.77, 3.95)	0.37 (-3.23, 3.97)	-0.57 (-6.28, 5.13)	***6.63 (2.16, 11.10)***	***3.41 (0.46, 6.37)***
Employment (ref: Unemployed)							
Employed	-0.89 (-3.81, 2.03)	-1.78 (-4.04, 0.47)	-2.06 (-4.89, 0.78)	***-2.69 (-5.29, -0.10)***	-1.04 (-3.81, 1.74)	-2.14 (-0.43, 4.67)	1.14 (-1.33, 3.61)
Age of Sexual Debut (ref: ≤ 15 years)							
16-19 years	***3.02 (0.25, 5.79)***	-1.23 (-3.47, 1.01)	-1.15 (-4.05, 1.75)	-0.30 (-2.48, 1.89)	-0.56 (-3.09, 1.98)	0.60 (-1.60, 2.80)	0.23 (-2.36, 2.82)
> 20 years	***4.22 (0.29, 8.14)***	-0.22 (-4.57, 4.13)	-2.38 (-6.34, 1.57)	1.96 (-0.73, 4.64)	0.60 (-2.42, 3.61)	***7.08 (3.50, 10.65)***	2.56 (-1.30, 6.42)
Behavioral Bisexuality in Lifetime (ref: No)							
Yes	***2.58 (0.93, 6.22)***	-0.57 (-2.86, 1.71)	2.17 (-0.70, 5.03)	1.50 (-0.58, 3.58)	***5.81 (2.94, 8.67)***	1.92 (-0.27, 4.11)	2.02 (-0.67, 4.71)
Relationship Status (Ref: Single)							
In a relationship	-2.19 (-4.65, 0.27)	-1.73 (-3.86, 0.40)	***-3.52 (-6.04, -0.99)***	-1.66 (-3.62, 0.30)	0.90 (-1.29, 3.09)	***-2.20 (-4.24, -0.17)***	***-3.29 (-5.61, -0.98)***
Number of Gay friends in Social Network (ref: 0 gay friends)							
≤10 friends	-9.48 (-19.26, 0.30)	***-21.28 (-31.04, -11.52)***	-8.46 (-17.32, 0.40)	-3.48 (-9.89, 2.94)	***-6.70 (-10.73, -2.67)***	10.13 (-0.13, 20.38)	***-9.95 (-16.98, -2.92)***
11-20 friends	***-14.00 (-24.00, -4.01)***	***-22.91 (-32.68, -13.13)***	-7.62 (-16.70, 1.45)	***-7.64 (-14.01, -1.26)***	***-10.88 (-15.26, -6.50)***	5.46 (-4.85, 15.78)	***-10.32 (-17.50, -3.14)***
≥21 friends	***-17.21 (-27.02, -7.39)***	***-23.99 (-33.55, -14.42)***	***-13.56 (-22.43, -4.68)***	***-10.36 (-16.51, -4.21)***	***-13.34 (-17.57, -9.10)***	3.05 (-7.18, 13.29)	***-12.18 (-19.07, -5.30)***

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Chapter III: Manuscript II

Social Stressors, Drug Use, and Intoxicated Intercourse among MSM in Seven Countries

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Social Stressors, Drug Use, and Intoxicated Intercourse among MSM in Seven Countries

Abstract

Rates of drug and alcohol use are higher among MSM than the general population, and are often associated with increased sexual risk taking and HIV seroconversion. We examine the prevalence of self-reported drug use and intoxicated intercourse, and their associations with socio-demographic characteristics, social networks, and social stress among a sample of MSM in 7 countries.

Sexually active MSM aged over 18 and residing in Australia, Brazil, Canada, South Africa, Thailand, the United Kingdom, and the United States were recruited through Facebook. Two outcomes were examined: reporting recent drug use and reporting intoxicated (drunk and/or high) intercourse at last sex.

Reporting recent drug use was significantly associated with reporting more experiences of external homophobic discrimination, and fewer feelings of heteronormative social pressure. Reporting intoxicated intercourse was significantly associated with more experiences of external homophobic discrimination, and more feelings of internalized homophobia. Being in a relationship was protective against intoxicated intercourse. The results highlight the role of social pressures in shaping risk-taking among MSM.

Background

Men who have sex with men (MSM) continue to be disproportionately affected by the HIV/AIDS pandemic [1]. Although new HIV infections are stable or decreasing among other risk groups [2], incident infections continue to increase among MSM in the United States [3], Western Europe, and Australia [4]. This pattern is also seen in other parts of the world; historically HIV/AIDS in low- and middle-income countries (LMICs) was most prevalent among heterosexuals, injection drug users (IDUs), and commercial sex workers (CSWs) [5]. However, a recent trend of emerging epidemics among MSM in LMICs is mirroring the epidemics seen in the United States and other developed countries, where incident HIV infection among MSM is either increasing or remaining at a level sufficient to sustain the epidemic [5-8], and in some LMICs, the HIV/AIDS prevalence among MSM eclipses that of the general population [6, 7].

There is a wealth of evidence to show that rates of drug [9-11] and alcohol use [10-12] among MSM are higher than those of the general population. In addition to the damaging physical and mental effects of drug and alcohol use, many studies have reported a positive association between drug and alcohol use and sexual risk taking among MSM, namely unprotected anal intercourse (UAI) [13, 14]. More specifically, studies have shown that drug [15-21] and alcohol use [15, 17-20, 22, 23] prior to or during intercourse, as well as any drug use in the previous year [15, 17, 24] were significantly associated with engaging in UAI with a partner of unknown or discordant HIV status, a known risk behavior for HIV transmission [13]. In addition to its association with increased sexual risk taking, having a history of non-injection drug use [25-31] as well as drug [25] and alcohol use [32] prior to or during intercourse have been identified as independent risk factors for HIV seroconversion among MSM. In particular, uses of methamphetamines [27, 30, 33], cocaine [25, 27-30], and nitrate inhalants [28, 30, 31] have been specifically implicated for their significant associations with HIV seroconversion, due to the association between the use of these substances and engaging in UAI [25, 27-31, 33].

Although there is a plethora of research investigating the links between drug use, intoxicated intercourse and risky sexual behaviors among MSM, few studies to date have attempted to identify factors that influence participation in drug use or intoxicated intercourse. One commonly cited explanation for the preponderance of these behaviors among MSM is behaviors and norms that are often found in gay-themed venues [34-37]. While these environments provide MSM with a social space safe from homophobic discrimination, alcohol is served and drugs may be available, such that drugs and alcohol become a normative element of gay/MSM socializing [34-36, 38]. Research also indicates that another norm – that sexual pleasure is heightened while intoxicated – may be responsible for high levels of drug/alcohol use and participation in intoxicated sex in the gay/MSM community [16, 37, 39].

The theory of minority stress suggests that MSM living in a heterosexist society are sexual minorities and are burdened by chronic stressors manifested through internalized homophobia, experiences of discrimination, and perceived stigma [40, 41]. Minority stress has been mentioned in literature investigating links between sexual risk taking and drug and alcohol use among MSM as a possible explanation for these behaviors [35]. These studies suggest that drug use and intoxicated intercourse may be coping mechanisms employed to mediate negative effects of minority stress, that is, behaviors that are adopted to cope with exposure to homophobia or internal struggles with sexual identity. Although there is now a wealth of literature showing minority stress as a plausible explanation for higher levels of mental health disorders among gay and bisexual men [41-45], research investigating minority stressors as correlates of drug use or intoxicated intercourse is limited [9, 46].

While the number of studies investigating links between alcohol and drug use and risky sexual behaviors among MSM in international settings is growing [9, 10, 14, 19, 26, 47, 48], the majority of studies have focused on MSM in the United States [12, 15, 17, 18, 24, 33, 34, 37, 49-52] or on specific subgroups of the MSM population, such as young MSM [14, 21], older MSM [14, 53], problem drinking MSM [54], or HIV positive MSM [16, 22]. This paper attempts to fill

several gaps in the literature by examining associations between socio-demographic characteristics, social networks, and experiences of homophobia, and drug use and engaging in intoxicated (high and/or drunk) intercourse among MSM in seven countries: Australia, Brazil, Canada, South Africa, Thailand, the United Kingdom (UK) and the United States (U.S.). This novel study is the only cross-country examination of factors influencing drug use and intoxicated intercourse among MSM to date; providing insight into the prevalence of substance use among MSM in 7 countries and the extent to which factors associated with these behaviors vary. This new information is vital for the development of HIV prevention messaging that targets drug use as an antecedent to HIV acquisition.

Methods

Participants were recruited for a self-administered survey via Facebook. Over a 5-14 day period, banner ads were placed on Facebook, targeted to men who indicated an interest in men on their profiles and reported residency in Australia, Brazil, Canada, South Africa, Thailand, the United Kingdom (UK) or the United States (U.S.). Clicking on the advertisement led potential participants to information regarding the survey; after obtaining electronic informed consent, participants were invited to complete the survey. Being born male, being over 18 years of age, and self-reporting having had sex with a man in the previous year were requirements for eligibility. Except for the Brazilian and Thai surveys, which were conducted in Portuguese and Thai, respectively, all surveys were conducted in English.

A total of 11,850 people in the seven sample countries clicked on the advertisement and were subsequently exposed to the survey. Of these, 6,874 people began the survey. 1,551 (22.6%) did not meet eligibility criteria and were disqualified from completion. 2,021 men (29.4%) began but did not finish the survey, and 3,302 (48.0%) completed the survey. Of the men who completed the survey, 2,801 (84.9%) provided data for all covariates of interest and were included in the current analysis.

The survey collected information on the participants' demographic and socio-economic characteristics (e.g. age, race/ancestry, level of education, and employment status), in addition to data on respondents' sexual orientation, age of sexual debut, relationship status, and recent (≤12 months) sexual behavior. Age of sexual debut was self-reported as the age which the respondent first had sex with either a man or a woman. Having a main partner was determined by asking respondents if they were in a sexual relationship with a main partner (*"Are you currently in a sexual relationship?"*). In order to measure behavioral bisexuality, respondents were asked whether they had ever had sex with a woman in the previous year (*"Approximately how many women have you had vaginal or anal sex with in the past 12 months?"*). Respondents were asked how many gay friends or acquaintances they had, as a measure of the extent of their social networks and access to the gay community (*"Approximately how many people do you know that identify themselves as a gay or bisexual man?"*).

Participants were asked a series of questions to measure their experiences of both external and internalized homophobia and of heteronormative social pressure, which measures our three minority stress indicators. To measure experiences of external homophobic discrimination, a battery of 11 questions regarding types of homophobic discrimination (e.g. *"Due to your sexual orientation were you ever made fun of as a child?")* was included. Affirmative responses were assigned one point, creating a hypothetical score range of zero to 11, where a higher score represented more experiences of homophobic discrimination. Internalized homophobia was assessed using a 20-item subset of the Gay Identity Questionnaire, a validated tool which measures the degree of acceptance of homosexual behaviors, thoughts, and feelings [55]. Responses affirming internally homophobic attitudes (e.g. *"I dread having to deal with the fact that I may be homosexual"*) were assigned positive point values, responses indicating gay pride (e.g. *"I am very proud to be gay and make it known to everyone around me"*) were assigned negative point values, and neutral responses were assigned no points. The scale ranged from zero to 80, where a higher score represented a lower acceptance of respondents' homosexual

behaviors, thoughts, and feelings, and decreased gay pride. Experiences of heteronormative social pressure were measured by creating an index scale of responses to 4 questions assessing the degree to which respondents felt obligated to live a heterosexual lifestyle by hiding their homosexuality, getting married, having children, and having sex with women. Responses for each question ranged from 1 to 5, and were summed, creating a total range from 4 to 20, with a higher score representing greater feelings of heteronormative social pressure.

The analysis examines the extent to which social networks and experiences of homophobic discrimination and social pressures are associated with drug use and experiencing sex while intoxicated. To measure drug use and intoxicated intercourse, respondents were asked about illicit drug use in the previous year (*"In the past 12 months…have you used any non-prescription drugs?"*), if they were buzzed or drunk at last sexual intercourse (*"The last time you had sex with… were you buzzed or drunk on alcohol?"*), and if they were high at last sexual intercourse (*"The last time you had sex with… were you high on drugs?"*). These three questions provide the two outcomes for analysis, two binary variables measuring 1) any illicit drug use in the last year and 2) recent experience of intoxicated intercourse (which combines being drunk or being high at last sex).

Data were analyzed using STATA 12 [56]. Two separate logistic models were fitted for each of the two outcomes in each of the 7 countries. Key covariates for analysis included: age (categorized as 18-24, 25-34, 35-44, and ≥45, except for Brazil and Thailand, which were categorized as 18-24, 25-34, and ≥35 due to a small number of respondents aged ≥45), education (dichotomized as receiving a secondary school education or less (≤12 years) or receiving higher education (>12 years)), and race/ancestry (categorized differently in each country: White/European, Aboriginal, Other (Australia, Canada); White, Other (UK, U.S.); White, Mixed, Other (Brazil); White, Black, Other (South Africa); and Thai, Other (Thailand)). Age of sexual debut was categorized into 3 groups: ≤15 years, 16-20 years, >20 years. Relationship status was defined as being in a relationship with a man versus single; respondents reporting a relationship

with a woman were classified as single. Sexual orientation was a binary variable, characterized as gay or bisexual. The number of gay friends in respondents' social networks were grouped into categories of zero friends, ≤10 friends, 11-20 friends, and ≥21 friends. Key covariates of interest in both models were the three measures of minority stress and the size of the respondents' social network.

Results

Reported drug use in the previous year was high, and ranged from 29.9% of respondents in Thailand to 48.1% of respondents in Canada. Reported intoxicated intercourse at last sex was lower, ranging from 9.74% of respondents in Thailand to 21.1% of respondents in Canada and the UK. Demographic characteristics of the sample and mean index scores for external homophobic discrimination, internalized homophobia, and experiences of heteronormative social pressure are presented in Table 1. Across all countries, the majority of the sample was between the ages of 18-24 (except South Africa and Thailand), with 12 or more years of education, and of White/European/Thai race/ancestry. Furthermore, the majority of respondents reported homosexual/gay sexual orientation, no behavioral bisexuality in the previous 12 months, current employment, and having 20 or more gay friends in their social networks. Mean index scores of external homophobic experiences ranged from 4.08 (2.04) in Thailand to 5.70 (2.64) in Brazil, mean index scores of internalized homophobia ranged from 13.26 (11.11) in the UK to 27.20 (12.72) in Thailand, and mean index scores of heteronormative social pressures ranged from 6.61 (3.52) in the UK to 9.95 (5.30) in Thailand. Bivariate relationships between reporting drug use and intoxicated intercourse varied differently by covariates and by country as well as by mean minority stress scale indices scores and by country (Table 2).

The factors significantly associated with self-reported recent drug use varied across the seven countries, (Table 3). Compared to respondents aged 18-24, older respondents has significantly increased odds of reporting drug use among Australians aged 25-34, Thais aged 25-

34, and Americans aged 35-44 (Australia, OR: 1.95, 95% CI: 1.07-3.56; Thailand, OR: 1.78, 95% CI: 1.01-3.11; U.S, OR: 2.33, 95% CI: 1.02-5.30), but significantly decreased odds of reporting drug use among South Africans aged ≥45 (OR: 0.42, 95% CI: 0.21-0.84). Compared to White respondents, Brazilians of other races and Black South Africans had significantly lower odds of reporting drug use in the previous year (Brazil, OR: 0.36, 95% CI: 0.17-0.75; South Africa, OR: 0.30, 95% CI: 0.13-0.69), whereas Britons of other races had significantly higher odds of reporting drug use in the previous year (OR: 3.25, 95% CI: 1.18-8.95). Compared to respondents whose age of sexual debut was less than 16 years, Australians with older ages of sexual debut had significantly lower odds of reporting drug use in the previous 12 months (16-19 years, OR: 0.56, 95% CI: 0.32-0.96; >20 years, OR: 0.20, 95% CI: 0.09-0.44), as were Brazilians whose age of sexual debut was 20 years or older (OR: 0.20, 95% CI: 0.32-0.99).

Fewer covariates were significantly associated with the reporting intoxication at last sex (Table 3). Respondents in Australia, Brazil, Canada, the UK, and the U.S who reported having a main partner had significantly lower odds of reporting intoxication at last intercourse (Australia, OR: 0.44, 95% CI: 0.24-0.79; Brazil, OR: 0.39, 95% CI: 0.19-0.80; Canada, OR: 0.43, 95% CI: 0.25-0.75; UK, OR: 0.31, 95% CI: 0.18-0.53; US, OR: 0.30, 95% CI: 0.16-0.56) than respondents without a main partner. Compared to respondents with no gay friends in their social networks, South African respondents with 11-20 gay friends and 21 or more gay friends had lower odds of reporting intoxication at last intercourse (11-20 gay friends, OR: 0.24, 95% CI: 0.06-0.92; >20 gay friends, OR: 0.26, 95% CI: 0.07-0.95, respectively).

Reported drug use and intoxication at last sex were significantly associated with all three minority stress indices. Having more experiences of external homophobic discrimination significantly increased odds of reporting drug use in the previous 12 months among respondents in Australia and Brazil (Australia, OR: 1.19, 95% CI: 1.07-1.31; Brazil, OR: 1.13, 95% CI: 1.01-1.25), and significantly increased odds of reporting intoxication at last intercourse among respondents in Australia and South Africa (Australia, OR: 1.14, 95% CI: 1.01-1.28; South Africa,

OR: 1.04, 95% CI: 1.01-1.07). While respondents in the U.S. with higher mean internalized homophobia index scores had significantly lower odds of reporting drug use (OR: 0.97, 95% CI: 0.95-0.99), having higher mean internalized homophobia index scores significantly increased odds of reporting drug use in the previous 12 months among respondents in Brazil (OR: 1.02, 95% CI: 1.00-1.04), and significantly increased odds of reporting intoxication at last intercourse among respondents in Canada and Thailand (Canada, OR: 1.03, 95% CI: 1.00-1.06; Thailand, OR: 1.04, 95% CI: 1.01-1.07). However, increasing heteronormative social pressures significantly decreased odds of reporting drug use in Australia, South Africa, and the UK (Australia, OR: 0.91, 95% CI: 0.94-0.99; RSA, OR: 0.91, 95% CI: 0.85-0.97; UK, OR: 0.92, 95% CI: 0.84-0.99) and recent intoxicated intercourse in Canada (OR: 0.90, 95% CI: 0.82-0.99).

Discussion

Although there is an abundance of literature demonstrating high levels of drug and alcohol use among MSM [9-12] and the links between drug/alcohol use and sexual-risk taking are well-known [13-15, 17-24], there is a paucity of research that has explored the factors that are associated with participation in these risk-taking behaviors. Few studies have explored these issues in international settings and none have sought to make cross-national comparisons in the factors shaping participation in drug and alcohol related risks among MSM. Additionally, the role of the wider social-cultural context in shaping drug and alcohol related risks among MSM is largely ignored: the results presented here point to the role of several measures of social stress in shaping individual reporting of drug use and intoxicated intercourse among MSM in seven culturally and economically diverse settings.

The use of drugs and alcohol or participation in intoxicated sex may be a coping mechanism among MSM who are exposed to discrimination or external social pressures for heteronormativity. Respondents reporting more experiences of external homophobic discrimination were significantly more likely to report drug use (Australia and Brazil) and

intoxicated intercourse (Australia and South Africa). Similarly, respondents in Brazil reporting more feelings of internalized homophobia were significantly more likely to report drug use: in some contexts drug use may be a strategy to mitigate stress associated with internal homonegativity and to normalize same-sex thoughts, feelings, and behaviors. This finding corroborates previous research [39, 57] which suggests that MSM may use alcohol with the expectancy that it will lower inhibitions associated with same-sex sexual activity, particularly in environments where homosexuality is highly stigmatized. Folch et al (2009) previously reported an association between experiencing episodes of external homophobic discrimination and drug use among MSM in Spain, suggesting that drug and alcohol use may be a coping strategies adopting in response to discrimination against sexual minorities. Studies by Stall et al. (2001), Greenwood et al. (2001), and Rosario et al. (2004) found that greater involvement in gay-related culture, namely attendance at gay bars and clubs, is significantly associated with increased drug use, likely because these environments provide more opportunities for and normalization of this behavior. Hence, the widespread availability of drugs in gay venues and the normalization of drug and alcohol use in the gay community make this an easily accessible coping mechanism for MSM. However, the finding that in two countries (Brazil and the U.S.) internalized homophobia was significantly linked to reported drug use contrasts to work by Folch et al (2009) and Theide et al (2003), who previously found that feelings of internalized homophobia did not have a significant effect on drug risk behaviors among MSM in Spain and the U.S., respectively.

However, the results suggest that the coping mechanism hypothesis does not fully explain the participation in drug behaviors among MSM, and associations between social pressures and drug use were inconsistent. Reporting more feelings of heteronormative social pressure was in fact significantly associated with less drug use (Australia, South Africa, and the UK) and significantly less intoxicated intercourse (Canada). Similarly, MSM in the U.S. reporting more feelings of internalized homophobia were significantly less likely to report drug use. These associations may be the result of less “outness” and/or less participation in the gay/MSM

community among men with less well formed gay identities or those who feel more pressure to conform to heteronormativity due to feelings of stigmatization associated with same-sex sexual activity. Hence, MSM who are marginalized from the gay community may have less exposure to drugs, and less exposure to the normalization of drug taking in gay venues.

Being in a relationship was associated with lower reporting of intoxicated intercourse in all countries but South Africa and Thailand, pointing to the role of partnerships as a mediator in experiencing stressors. Having a partner may provide both social and emotional support for the chronic stress experienced by sexual minorities. As a result, the support provided by a main partner may replace other riskier coping mechanisms such as engaging in drug or alcohol use. It is possible that MSM in relationships are less active in the gay/MSM bar and club scene than single MSM, meaning they experience less exposure to drugs and alcohol, or are not using drugs/ alcohol as a mechanism to fuel sex. This finding supports research by Folch et al (2009), which also found that alcohol use was lower among MSM with a steady partner.

Having more gay friends may provide more opportunities to socialize in environments that promote drug/alcohol use, more opportunities to access drugs/ alcohol, or exposure to negative role models and influences. Several studies have suggested that the types of social networks held by gay men and MSM influence their sexual risk-taking [58-63]; however, the directionality and magnitude of these influences are varied in the literature. Gay men whose social networks contain individuals with perceived or actual greater sexual risk-taking are themselves more likely to partake in high-risk behaviors [60, 61], while positive perceptions of peer's condom norms have been shown to positively influence condom use behavior among MSM [62, 64-67]. Increasing social support has been shown to be correlated with stronger condom norms and reduced unprotected anal intercourse among MSM living with HIV [68], whereas African-American gay men are more likely to engage in unprotected anal sex if they report receiving less social support from family and friends [69]. However, in this analysis we find no association between size of social network – as measured by self-reported number of gay

friends – and participation in drug behaviors. While, others [34-36] have measured attendance at gay bars and clubs as a measure of gay social participation, our indicator of social network size may in fact be measuring a larger domain, not just limited to attendance at gay clubs/bars. A larger social network of gay friends may be measuring access to social support and resources, positive influences that may be protective against participation in negative behaviors. However, given the insignificance of the associations in the current study, further investigation is warranted to establish how social networks influence drug use among gay/ MSM.

There are several important limitations to the present study, most of which result from its internet-based sampling design. In all countries, the survey was advertised only to MSM who were registered users of Facebook and had a profile indicating an interest in men. Consequently, MSM who are more open about their sexuality may be oversampled: this may represent a bias given that a principal aim was to measure the effect of social pressures on drug behaviors. Such bias could possibly lead to an over-reporting of experiencing external homophobic discrimination and underreporting of internalized homophobia, two key covariates in our analysis. Furthermore, a significant proportion of those who clicked on the banner ads did not complete the survey: we do not have data on their characteristics to establish the extent of this selectivity bias. Previous studies suggest that MSM who participate in research are generally non-representative of the larger MSM community; they tend to be better educated, more open about their sexualities, and more likely to be white [57]. These characteristics are certainly reflected in our sample. Lastly, because of the cross-sectional survey design, we cannot make causal inferences between our covariates and outcomes. Despite these limitations, however, this study demonstrated the usefulness of an internet-based survey tool in reaching traditionally hard-to-reach populations, and for collecting standardized data across economically and culturally diverse settings.

Conclusion

The results from this study point to the confluence of socio-cultural and environmental factors associated with reporting drug use and intoxicated intercourse among MSM. Our findings that social stressors, particularly experiences of external homophobic discrimination and feelings of heteronormativity, are significantly associated with reporting these risk behaviors suggest that future research should focus on incorporating experiences of homophobia into risk-reduction strategies for MSM, as well as HIV/STI counseling and testing tools. Additionally, while we found that the size of MSM's social network was not significantly associated with reporting drug use or intoxicated intercourse, an investigation into the pathways through which social networks influence both positive and negative behaviors would be a valuable contribution to research.

Table 1: Background Demographic Characteristics by Country							
Variable	**Australia[§] (n=358)**	**Brazil[ǂ] (n=454)**	**Canada[§] (n=360)**	**S. Africa[¥] (n=465)**	**Thailand* (n=421)**	**UK (n=394)**	**US (n=349)**
Age							
18-24 years	52.8%	65.9%	40.8%	26.5%	38.2%	50.8%	56.7%
25-34 years	22.9%	25.3%	25.0%	35.1%	43.7%	23.6%	16.6%
35-44 years	14.2%	8.8%	13.6%	21.7%	18.1%	12.7%	9.2%
≥45 years	10.1%	--	20.6%	16.8%	--	12.9%	17.5%
Education							
≤ 12 years	38.8%	38.1%	24.7%	32.3%	22.6%	20.8%	30.4%
> 12 years	61.2%	61.9%	75.3%	67.7%	77.4%	79.2%	69.6%
Ancestry/Race							
European[§]/White/Thai*	57.8%	57.1%	81.9%	83.4%	96.0%	94.9%	80.5%
Aboriginal[§]/Mixed[ǂ] /Black[¥]	33.2%	28.4%	5.8%	8.8%	--	--	--
Other	8.9%	14.5%	12.2%	7.7%	4.0%	5.1%	19.5%
Sexual Orientation							
Gay/Homosexual	95.5%	96.0%	95.6%	97.2%	95.0%	98.0%	97.4%
Bisexual	4.5%	4.0%	4.4%	2.8%	5.0%	2.00%	2.6%
Employment							
Unemployed	23.2%	30.8%	27.2%	19.6%	28.0%	32.2%	32.1%
Employed	76.8%	69.2%	72.8%	80.4%	72.0%	67.8%	67.9%
Age of Sexual Debut							
≤15 years	28.5%	56.0%	35.0%	39.8%	38.2%	41.6%	34.1%
16-20 years	56.2%	37.2%	49.2%	39.4%	40.4%	48.0%	53.0%
>20 years	15.4%	6.8%	15.8%	20.9%	21.4%	10.4%	12.9%
Relationship Status							
Single	52.5%	53.5%	42.8%	43.9%	50.4%	46.7%	50.1%
In a Relationship	47.5%	46.5%	57.2%	56.2%	49.6%	53.3%	49.9%
Behavioral Bisexuality in Previous 12 Months							
No	96.4%	92.5%	94.7%	97.5%	95.3%	97.7%	95.4%
Yes	3.6%	7.5%	5.3%	2.5%	4.7%	2.3%	4.6%
Number of Gay Friends in Social Network							
0 friends	1.4%	0.9%	1.9%	2.6%	8.3%	1.0%	2.9%
≤10 friends	33.5%	19.8%	28.9%	16.8%	41.6%	30.0%	28.7%
11-20 friends	22.4%	19.4%	19.2%	21.7%	21.4%	25.1%	20.9%
≥21 friends	42.7%	59.9%	50.0%	58.9%	28.7%	43.9%	47.6%
Scale Indices Scores (mean/sd)							
External Homophobia	5.13 (0.13)	5.70 (0.10)	5.14 (2.53)	5.89 (2.32)	4.08 (2.04)	4.81 (2.24)	5.36 (2.64)
Internalized Homophobia	16.65 (0.67)	17.21 (0.56)	15.34 (12.90)	13.50 (10.91)	27.20 (12.72)	13.26 (11.11)	13.53 (11.14)
Social Pressure	7.10 (0.19)	8.45 (0.21)	7.56 (3.92)	7.01 (3.92)	9.95 (5.30)	6.61 (3.52)	7.57 (3.83)

Table 2: Drug Use in Previous 12 Months							
Variable	**Australia[§] (n=358)**	**Brazil[ŧ] (n=454)**	**Canada[§] (n=360)**	**South Africa[¥] (n=465)**	**Thailand* (n=421)**	**UK (n=394)**	**US (n=349)**
TOTAL	42.5%	30.0%	48.1%	41.1%	29.9%	35.0%	37.3%
Age							
18-24 years	37.6%	29.4%	45.6%	36.6%	29.2%	34.0%	35.9%
25-34 years	48.8%	28.7%	51.1%	49.7%	32.1%	38.7%	32.8%
35-44 years	51.0%	37.5%	57.1%	42.6%	26.3%	38.0%	56.3%
≥45 years	41.7%	--	43.2%	28.2%	--	29.4%	36.1%
Education							
≤ 12 years	37.4%	30.1%	47.2%	42.7%	29.5%	37.8%	38.7%
> 12 years	45.7%	29.9%	48.3%	40.3%	30.1%	34.3%	36.6%
Ancestry/Race							
European[§]/White/Thai*	42.0%	***33.2%***	48.5%	44.1%	29.2%	34.0%	37.4%
Aboriginal[§]/Mixed[ŧ] /Black[¥]	47.9%	***30.2%***	61.9%	22.0%	--	--	--
Other	25.0%	***16.7%***	38.6%	30.6%	29.9%	55.0%	36.8%
Sexual Orientation							
Gay/Homosexual	43.0%	30.3%	48.8%	41.4%	29.8%	34.7%	37.4%
Bisexual	31.3%	22.2%	31.3%	30.8%	33.3%	50.0%	33.3%
Employment							
Unemployed	36.1%	27.1%	54.1%	37.4%	***39.0%***	30.7%	34.8%
Employed	44.4%	31.2%	45.8%	42.0%	***26.4%***	37.1%	38.4%
Age of Sexual Debut							
≤15 years	***54.9%***	30.3%	46.8%	46.0%	30.4%	40.9%	43.7%
16-20 years	***41.3%***	31.4%	52.0%	39.9%	31.8%	31.8%	33.0%
>20 years	***23.6%***	19.4%	38.6%	34.0%	25.6%	26.8%	37.8%
Relationship Status							
Single	43.6%	28.4%	47.4%	40.7%	30.2%	35.9%	38.9%
In a relationship	41.2%	31.8%	48.5%	41.4%	29.7%	34.3%	35.6%
Behavioral Bisexuality in Previous 12 Months							
No	42.3%	***28.6%***	46.9%	41.7%	30.2%	34.6%	37.8%
Yes	46.2%	***47.1%***	68.4%	45.5%	25.0%	55.6%	25.0%
Number of Gay Friends in Social Network							
0 friends	***40.0%***	***25.0%***	42.9%	***16.7%***	20.0%	***25.0%***	40.0%
≤10 friends	***35.9%***	***16.6%***	43.3%	***30.8%***	27.4%	***23.3%***	34.0%
11-20 friends	***36.3%***	***23.9%***	50.7%	***41.6%***	37.8%	***30.3%***	37.0%
≥21 friends	***51.0%***	***36.4%***	50.0%	***44.9%***	30.6%	***45.7%***	39.2%
Experiences of External Homophobic Discrimination (scale 0-11)							
No recent drug use	***4.77 (2.27)***	***5.55 (2.09)***	5.15 (2.62)	5.77 (2.34)	***3.91 (2.03)***	4.86 (2.39)	5.27 (2.68)
Yes recent drug use	***5.63 (2.45)***	***6.05 (2.10)***	5.14 (2.43)	6.07 (2.28)	***4.47 (2.04)***	4.70 (1.94)	5.51 (2.59)

Internalized Homophobia (scale 0-80)							
No recent drug use	17.64 (12.94)	16.95 (11.97)	15.95 (13.57)	***14.39 (11.93)***	27.34 (13.02)	***14.14 (11.92)***	***14.45 (11.59)***
Yes recent drug use	15.32 (12.03)	17.82 (11.88)	14.68 (12.14)	***12.21 (9.15)***	26.87 (12.04)	***11.61 (9.22)***	***11.98 (10.19)***
Heteronormative Social Pressure (scale 4-20)							
No recent drug use	***7.49 (3.87)***	8.54 (4.52)	7.62 (3.95)	***7.49 (4.25)***	9.87 (5.35)	***6.95 (3.89)***	7.60 (3.90)
Yes recent drug use	***6.58 (3.11)***	8.25 (4.26)	7.50 (3.91)	***6.32 (3.28)***	10.14 (5.19)	***5.99 (2.59)***	7.51 (3.71)

Table 2, continued: High or Drunk at Last Sex							
Variable	**Australia[§] (n=358)**	**Brazil[ŧ] (n=454)**	**Canada[§] (n=360)**	**South Africa[¥] (n=465)**	**Thailand* (n=421)**	**UK (n=394)**	**US (n=349)**
TOTAL	21.0%	10.4%	21.1%	19.14%	9.74%	21.1%	19.2%
Age							
18-24 years	23.3%	10.7%	23.8%	17.9%	9.9%	25.5%	19.2%
25-34 years	18.3%	8.7%	21.1%	21.5%	10.8%	15.1%	24.1%
35-44 years	19.6%	12.5%	20.4%	21.8%	6.6%	18.0%	28.1%
≥45 years	16.7%	--	16.2%	12.8%	--	17.7%	9.8%
Education							
≤ 12 years	20.1%	10.4%	19.1%	17.3%	8.4%	23.2%	14.2%
> 12 years	21.5%	10.3%	21.8%	20.0%	10.1%	20.5%	21.4%
Ancestry/Race							
European[§]/White/Thai*	***18.8%***	11.6%	21.4%	18.6%	9.9%	20.6%	18.5%
Aboriginal[§]/Mixed[ŧ] /Black[¥]	***27.7%***	7.0%	33.3%	19.5%	--	--	--
Other	***9.4%***	12.1%	13.6%	25.0%	5.9%	30.0%	22.1%
Sexual Orientation							
Gay/Homosexual	20.2%	10.3%	20.9%	19.0%	9.5%	20.7%	19.7%
Bisexual	37.5%	11.1%	25.0%	23.1%	14.3%	37.5%	0.0%
Employment							
Unemployed	22.9%	12.9%	17.4%	20.9%	6.8%	17.3%	21.4%
Employed	20.4%	9.2%	22.5%	18.7%	10.9%	22.9%	18.1%
Age of Sexual Debut							
≤15 years	24.5%	10.2%	19.8%	20.5%	12.4%	23.2%	17.7%
16-20 years	18.9%	11.8%	23.2%	18.6%	7.1%	20.6%	19.5%
>20 years	21.8%	3.2%	17.5%	17.5%	10.0%	14.6%	22.2%
Relationship Status							
Single	***27.7%***	***13.6%***	***29.2%***	22.6%	10.4%	***31.0%***	***26.9%***
In a relationship	***13.5%***	***6.6%***	***15.1%***	16.5%	9.1%	***12.4%***	***11.5%***
Behavioral Bisexuality in Previous 12 Months							
No	20.3%	10.5%	20.2%	19.0%	9.5%	20.5%	19.2%
Yes	38.5%	8.8%	36.8%	36.4%	15.0%	44.4%	18.8%
Number of Gay Friends in Social Network							
0 friends	40.0%	***25.0%***	14.3%	41.7%	8.6%	25.0%	30.0%
≤10 friends	22.5%	***5.6%***	22.1%	21.8%	6.3%	16.1%	18.0%
11-20 friends	20.0%	***4.6%***	17.4%	15.8%	14.4%	21.2%	12.3%
≥21 friends	19.6%	***13.6%***	22.2%	18.6%	11.6%	24.3%	22.3%
Experiences of External Homophobic Discrimination (scale 0-11)							
Not intoxicated at last sex	5.03 (2.38)	5.71 (2.10)	5.05 (2.54)	***5.79 (2.35)***	4.09 (2.08)	4.86 (2.29)	5.37 (2.61)
Intoxicated at last sex	5.52 (2.38)	5.66 (2.21)	5.49 (2.46)	***6.33 (2.13)***	3.93 (1.63)	4.63 (2.05)	5.33 (2.80)

Internalized Homophobia (scale 0-80)							
Not intoxicated at last sex	16.13 (12.19)	16.95 (11.73)	14.97 (12.73)	13.54 (11.15)	***26.77 (12.71)***	13.21 (11.18)	13.45 (10.88)
Intoxicated at last sex	18.64 (13.94)	19.47 (13.54)	16.72 (13.51)	13.33 (9.91)	***31.15 (12.31)***	13.42 (10.90)	13.90 (12.24)
Heteronormative Social Pressure (scale 4-20)							
Not intoxicated at last sex	7.13 (3.71)	8.33 (4.36)	1.67 (4.10)	7.08 (3.95)	9.85 (5.28)	6.53 (3.50)	7.52 (3.87)
Intoxicated at last sex	6.99 (3.13)	9.53 (5.02)	7.17 (3.17)	6.72 (3.77)	10.90 (5.44)	6.93 (5.56)	7.75 (3.67)

Table 3: Drug Use in Previous 12 Months							
Variable	**Australia[§]**	**Brazil[†]**	**Canada[§]**	**South Africa[¥]**	**Thailand***	**United Kingdom**	**United States**
Age (ref: 18-24 years)							
25-34 years	***1.95 (1.07-3.56)***	0.83 (0.49-1.39)	1.48 (0.83-2.66)	1.50 (0.87-2.60)	***1.78 (1.01-3.11)***	0.97 (0.55-1.71)	0.84 (0.42-1.67)
35-44 years	1.34 (0.64-2.81)	1.38 (0.64-3.01)	2.17 (1.05-4.48)	0.91 (0.49-1.70)	1.04 (0.51-2.10)	0.79 (0.37-1.67)	***2.33 (1.02-5.30)***
> 45 years	0.79 (0.35-1.81)	--	0.99 (0.51-1.93)	***0.42 (0.21-0.84)***	--	0.64 (0.30-1.36)	1.04 (0.53-2.01)
Education (ref: ≤ 12 years)							
> 12 years	***1.86 (1.14-3.04***)	0.89 (0.57-1.40)	1.00 (0.59-1.67)	0.91 (0.59-1.40)	1.21 (0.69-2.13)	0.75 (0.42-1.34)	0.87 (0.52-1.44)
Race (ref: European[§]/ White/Thai*)							
Aboriginal[§]/Mixed[†] / Black[¥]	1.37 (0.83-2.26)	0.93 (0.58-1.51)	1.98 (0.76-5.18)	***0.30 (0.13-0.69)***	--	--	--
Other	0.42 (0.16-1.11)	***0.36 (0.17-0.75)***	0.61 (0.31-1.23)	0.62 (0.28-1.35)	2.65 (0.91-7.71)	***3.25 (1.18-8.95)***	0.99 (0.55-1.78)
Sexual Orientation (ref: Homosexual/Gay)							
Bisexual	0.25 (0.04-1.52)	0.51 (0.14-1.88)	0.33 (0.09-1.25)	0.79 (0.17-3.60)	2.01 (0.58-6.98)	2.70 (0.45-16.13)	1.17 (0.23-6.03)
Employment (ref: Unemployed)							
Employed	1.35 (0.75-2.41)	1.18 (0.74-1.89)	0.61 (0.37-1.00)	0.85 (0.49-1.48)	***0.43 (0.25-0.74)***	1.27 (0.77-2.08)	1.25 (0.76-2.07)
Age of Sexual Debut (ref: ≤ 15 years)							
16-19 years	***0.56 (0.32-0.96)***	1.17 (0.75-1.84)	1.31 (0.78-2.18)	0.87 (0.55-1.37)	1.17 (0.70-1.96)	0.71 (0.44-1.14)	0.64 (0.39-1.06)
> 20 years	***0.20 (0.09-0.44)***	0.54 (0.20-1.44)	0.70 (0.35-1.40)	***0.57 (0.32-0.99)***	0.85 (0.46-1.59)	0.62 (0.27-1.43)	0.86 (0.41-1.81)
Relationship Status (ref: Single)							
In a relationship	0.70 (0.43-1.15)	1.11 (0.72-1.72)	0.97 (0.62-1.51)	0.74 (0.49-1.12)	1.01 (0.65-1.57)	0.87 (0.55-1.37)	0.75 (0.47-1.21)
Behavioral Bisexuality in Previous 12 Months (ref: No)							
Yes	4.22 (0.66-26.97)	***2.45 (1.09-5.49)***	***3.62 (1.20-10.98)***	1.27 (0.28-5.74)	0.62 (0.17-2.26)	3.10 (0.67-14.36)	0.67 (0.18-2.44)
Number of Gay friends in Social Network (ref: 0 Gay Friends)							
<10 friends	0.36 (0.05-2.78)	0.56 (0.05-6.92)	1.15 (0.23-5.82)	1.97 (0.37-10.38)	1.49 (0.59-3.73)	0.79 (0.07-8.43)	0.56 (0.13-2.38)
11-20 friends	0.25 (0.03-2.04)	0.90 (0.07-11.18)	1.44 (0.27-7.59)	2.75 (0.53-14.26)	2.42 (0.91-6.43)	1.24 (0.12-13.25)	0.61 (0.14-2.60)
≥21 friends	0.44 (0.05-3.51)	1.65 (0.14-19.70)	1.54 (0.30-7.96)	3.24 (0.64-16.27)	1.75 (0.66-4.64)	2.21 (0.21-23.12)	0.62 (0.15-2.60)
External Homophobia	***1.19 (1.07-1.31)***	***1.13 (1.01-1.25)***	0.98 (0.90-1.07)	1.07 (0.98-1.17)	1.17 (1.05-1.31)	0.98 (0.88-1.09)	1.03 (0.94-1.13)
Internalized Homophobia	1.00 (0.98-1.03)	***1.02 (1.00-1.04)***	0.99 (0.97-1.02)	1.00 (0.98-1.02)	1.00 (0.98-1.02)	1.00 (0.97-1.02)	***0.97 (0.95-0.99)***

Heteronormative Social Pressure	***0.91 (0.94-0.99)***	0.96 (0.91-1.01)	1.01 (0.95-1.08)	***0.91 (0.85-0.97)***	1.00 (0.96-1.04)	***0.92 (0.84-0.99)***	1.02 (0.96-1.10)

Table 3, continued: High or Drunk at Last Sex							
Variable	**Australia[§]**	**Brazil[†]**	**Canada[§]**	**South Africa[¥]**	**Thailand***	**United Kingdom**	**United States**
Age (ref: 18-24 years)							
25-34 years	0.84 (0.41-1.72)	0.93 (0.42-2.10)	0.87 (0.43-1.77)	1.41 (0.72-2.74)	0.68 (0.30-1.52)	0.48 (0.23-0.98)	1.44 (0.65-3.22)
35-44 years	0.63 (0.26-1.50)	2.20 (0.70-6.85)	0.88 (0.36-2.15)	1.21 (0.57-2.57)	0.31 (0.10-1.00)	0.60 (0.25-1.46)	1.72 (0.66-4.45)
> 45 years	0.43 (0.15-1.21)	--	0.61 (0.26-1.42)	0.70 (0.29-1.69)	--	0.60 (0.25-1.42)	0.47 (0.17-1.27)
Education (ref: ≤ 12 years)							
> 12 years	1.28 (0.73-2.26)	1.01 (0.51-1.96)	1.14 (0.59-2.19)	1.13 (0.66-1.92)	0.98 (0.41-2.37)	0.67 (0.34-1.31)	1.77 (0.88-3.53)
Race (ref: European[§]/ White/Thai*)							
Aboriginal[§]/Mixed[†] / Black[¥]	1.64 (0.93-2.88)	0.52 (0.23-1.16)	2.24 (0.79-6.37)	0.89 (0.37-2.18)	--	--	--
Other	0.39 (0.10-1.47)	0.92 (0.37-2.29)	0.50 (0.19-1.31)	1.49 (0.64-3.46)	0.29 (0.03-3.17)	1.43 (0.47-4.35)	1.04 (0.52-2.10)
Sexual Orientation (ref: Homosexual/Gay)							
Bisexual	1.72 (0.32-9.25)	1.12 (0.21-5.88)	0.81 (0.17-3.75)	0.87 (0.17-4.61)	0.95 (0.16-5.57)	1.74 (0.26-11.46)	(excluded from model)
Employment (ref: Unemployed)							
Employed	1.14 (0.59-2.20)	0.76 (0.39-1.50)	1.54 (0.80-2.96)	0.80 (0.42-1.52)	2.15 (0.86-5.36)	1.64 (0.91-2.97)	0.72 (0.39-1.33)
Age of Sexual Debut (ref: ≤ 15 years)							
16-19 years	0.53 (0.28-1.01)	1.28 (0.67-2.47)	1.39 (0.73-2.65)	0.91 (0.52-1.59)	0.43 (0.19-0.97)	0.79 (0.45-1.37)	1.12 (0.60-2.11)
> 20 years	0.77 (0.32-1.83)	0.26 (0.03-2.07)	0.91 (0.37-2.23)	0.79 (0.40-1.56)	0.61 (0.25-1.49)	0.58 (0.21-1.61)	1.39 (0.55-3.52)
Relationship Status (ref: Single)							
In a relationship	***0.44 (0.24-0.79)***	***0.39 (0.19-0.80)***	***0.43 (0.25-0.75)***	0.66 (0.40-1.09)	0.77 (0.39-1.52)	***0.31 (0.18-0.53)***	***0.30 (0.16-0.56)***
Behavioral Bisexuality in Previous 12 Months (ref: no)							
In a relationship	1.22 (0.20-7.50)	0.62 (0.17-2.29)	2.23 (0.74-6.72)	2.50 (0.53-11.66)	1.43 (0.25-8.06)	2.22 (0.45-11.05)	0.81 (0.20-3.32)
Number of Gay friends in Social Network (ref: 0 Gay Friends)							
<10 friends	0.25 (0.03-2.09)	0.41 (0.03-6.27)	3.12 (0.28-35.28)	0.37 (0.10-1.39)	1.00 (0.25-4.11)	0.61 (0.05-7.16)	0.40 (0.08-1.89)
11-20 friends	0.21 (0.02-1.95)	0.38 (0.02-6.22)	2.36 (0.20-27.53)	***0.24 (0.06-0.92)***	3.14 (0.74-13.41)	1.07 (0.09-12.52)	0.20 (0.04-1.06)
≥21 friends	0.22 (0.02-1.98)	1.41 (0.10-19.88)	3.48 (0.31-39.66)	***0.26 (0.07-0.95)***	3.00 (0.69-13.03)	1.44 (0.13-16.42)	0.47 (0.10-2.20)
External Homophobia	***1.14 (1.01-1.28***)	0.93 (0.80-1.08)	1.10 (0.98-1.23)	***1.13 (1.02-1.26)***	0.92 (0.77-1.09)	0.97 (0.86-1.10)	0.99 (0.97-1.02)
Internalized Homophobia	1.02 (0.99-1.04)	1.01 (0.98-1.04)	***1.03 (1.00-1.06)***	1.00 (0.97-1.02)	***1.04 (1.01-1.07)***	1.00 (0.97-1.03)	0.99 (0.97-1.02)

Social Pressure	0.91 (0.83-1.01)	1.05 (0.98-1.13)	***0.90 (0.82-0.99)***	0.94 (0.87-1.01)	1.04 (0.98-1.12)	1.01 (0.93-1.10)	1.02 (0.93-1.10)

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Chapter IV: Manuscript III

Perceptions of HIV Seriousness, Risk, and Inability to Avoid Sero-conversion Among HIV-Negative MSM in Seven Countries

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Perceptions of HIV Seriousness, Risk, and Inability to Avoid Sero-conversion Among HIV-Negative MSM in Seven Countries

Abstract

Perceptions of HIV seriousness and risks of infection associated with sexual behaviors are potential drivers of MSM willingness to participate in unsafe sexual practices. We examine perceptions of HIV seriousness, risk of HIV infection, and ability to remain sero-negative, and their associations with socio-demographic characteristics, social pressures, and self-reported sexual behaviors among samples of self-reported HIV-negative MSM in 7 countries. Sexually active MSM aged over 18 and residing in Australia, Brazil, Canada, South Africa, Thailand, the United Kingdom, and the United States were recruited through Facebook and completed an online survey. Three outcomes were examined: perceived seriousness of HIV seroconversion (scale 1-5), perceived risk of contracting HIV based on current behavior (scale 1-10), and perceived lifetime inability to remain HIV negative (scale 1-5). HIV seroconversion was universally perceived as serious, while perceptions of HIV risk were relatively low across all countries. Reporting increased sexual risk taking was significantly associated with perceptions of increased risk for HIV seroconversion (all countries except for Thailand) and greater inability to remain HIV negative (South Africa, Thailand, and the UK). However, although the results indicate that MSM engaging in risky sexual behaviors correctly perceive themselves to be at increased risk for HIV sero-conversion, the overall low levels of reported risk suggest that MSM continue to underestimate the true risks of HIV infection. Reported risks of sero-conversion, seriousness of HIV infection and ability to remain sero-negative varied by a number of background factors, with men in relationships and older MSM reporting the lowest levels of risk. The results point to the need for HIV prevention messages to continue to focus on the HIV risks

of unsafe sex, and that such messages may need to be packaged differently for men in relationships.

Background

Men who have sex with men (MSM) continue to be disproportionately affected by the HIV/AIDS pandemic [1]: although new HIV infections are stable or decreasing among other risk groups [2], incident infections continue to increase among MSM in the United States [3], Western Europe, and Australia [4]. This pattern is also seen in other parts of the world; historically HIV/AIDS in low- and middle-income countries (LMICs) was most prevalent among heterosexuals, injection drug users (IDUs), and commercial sex workers (CSWs) [5]. However, a recent trend of emerging epidemics among MSM in LMICs is mirroring the epidemics seen in the U.S. and other developed countries, where incident HIV infection among MSM is either increasing or remaining at a level sufficient to sustain the epidemic [5-8]. In some LMICs, the HIV/AIDS prevalence among MSM even eclipses that of the general population [6, 7]. These increasing rates of incident HIV infections among MSM worldwide may be explained by recent evidence suggesting that MSM continue to engage in high-risk sexual behaviors, such as having unprotected anal intercourse with non-concordant casual partners, having multiple sexual partners, and engaging in sex while under the influence of drugs and/or alcohol [9-11].

Research suggests that MSM, particularly those engaging in high-risk activities, often underestimate their risk for HIV infection [12-15]. This finding is of particular importance, as many theories surrounding HIV-related health risk behaviors proffer that perceptions of HIV susceptibility and severity drive individuals' motivations to protect themselves from seroconversion [16-18]. Current literature frequently points to the advent of highly active antiretroviral therapy (HAART) as an explanation for MSM continuing to engage in risky sexual behaviors, despite knowledge of HIV transmission risks [11, 19-24]. Known as "HIV treatment optimism," this growing body of research suggests that rates of unprotected anal intercourse (UAI), and subsequently incident HIV infection, have increased among MSM since HAART became available in 1996 [13, 19, 22-24]. According to this literature, HIV treatment optimism manifests as perceptions of lower HIV susceptibility, because HAART makes HIV-positive

individuals less infectious [14, 19, 21, 23, 25, 26], and perceptions of lower HIV seriousness, since treatment options have turned HIV from a fatal disease to a manageable illness [11, 13]. However, conflicting studies posit that HIV treatment optimism is simply a post-hoc justification for sexual risk taking [11, 20] and argue that there is no significant association between HAART availability and high risk sexual behaviors [11]. Other theories used to explain the increase in MSM engaging in risky sexual behaviors include HIV/AIDS prevention fatigue, which suggests that individuals find it difficult or annoying to maintain safer sex activities [24, 27-31]; changes in sexual partner availability, which theorizes that improvements in health resulting from HAART replenishes the sexual risk-taking population [32]; and sero-sorting, defined as engaging in UAI solely with partners of the same HIV status [15, 31].

Despite the abundance of research on theories attempting to explain the growing number of MSM engaging in HIV risk behaviors, there is a scarcity of research addressing reported perceptions of HIV seriousness, risk, and/or susceptibility/threat among HIV-negative MSM as independent risk factors for high risk sexual behaviors. Furthermore, what research is available is limited to MSM in the U.S. and other resource-rich countries [13, 20, 28, 33]. This novel study adds to current literature in two key ways. First, the authors found no previous studies in which MSM quantify their perceptions of HIV seriousness, risk, or threat providing comparable, standardized data across multiple countries. Second, this is the first study to examine cross-national perceptions of HIV/AIDS seriousness, risk, and threat, and the association between these perceptions and high-risk sexual behaviors among MSM. Results from this study may be influential in informing HIV prevention and risk reduction strategies for MSM worldwide.

Methods

Participants were recruited for a self-administered survey via Facebook. Over a 5-14 day period (depending on country), banner ads were placed on Facebook, targeted to men who indicated an interest in men on their profiles and reported residency in Australia, Brazil, Canada,

South Africa, Thailand, the United Kingdom (UK) or the United States (U.S.). Clicking on the advertisement led potential participants to information regarding the survey; after obtaining electronic informed consent, participants were invited to complete the survey. Being born male, being over 18 years of age, and self-reporting having had sex with a man in the previous year were requirements for eligibility. Except for the Brazilian and Thai surveys, which were conducted in Portuguese and Thai, respectively, all surveys were conducted in English.

A total of 11,850 people across the seven sample countries clicked on the advertisement and were subsequently exposed to the survey. Of these, 6,874 people began the survey, 1,551 (22.6%) did not meet eligibility criteria and were disqualified from completion. 2,021 men (29.4%) began but did not finish the survey, and 3,302 (48.0%) completed the survey. Of the men who completed the survey, 1,652 (50.0%) provided data for all covariates of interest and were included in analysis.

The survey collected information on participants' demographic and socio-economic data (e.g. age, race/ancestry, and level of education), in addition to data on respondents' age of sexual debut, drug use, relationship status, sexual behaviors, and history of HIV testing. Age of sexual debut was self-reported as the age which the respondent first had sex with either a man or a woman. Drug use was self-reported as use of any non-prescription drugs in the previous 12 months (*"In the past 12 months…have you used any non-prescription drugs?"*). Relationship status was determined by asking respondents if they were in a sexual relationship (*"Are you currently in a sexual relationship?"*). In order to measure behavioral bisexuality, respondents were asked whether they had ever had sex with a woman in their lifetime (*"Approximately how many women have you had vaginal or anal sex with in your lifetime?"*). Respondents were questioned about the number of men they had had anal sex with in the previous 12 months, the number of men they had had unprotected anal sex with in the previous 12 months, and the number of men they had had anal sex with in their lifetime. Lastly, respondents were asked if

they had ever been tested for HIV, and (if applicable) the result, month, and year of their most recent HIV test.

Participants were asked a series of questions to measure their experiences of both external and internalized homophobia and of heteronormative social pressure. To measure experiences of external homophobic discrimination, a battery of 11 questions regarding types of homophobic discrimination (e.g. *"Due to your sexual orientation were you ever made fun of as a child?")* was included. Affirmative responses were assigned one point, creating a hypothetical score range of zero to 11, where a higher score represented greater experiences of homophobic discrimination. Internalized homophobia was assessed using a 20-item subset of the Gay Identity Questionnaire, a validated tool which measures the degree of acceptance of homosexual behaviors, thoughts, and feelings [34]. Responses affirming internally homophobic attitudes (e.g. *"I dread having to deal with the fact that I may be homosexual"*) were assigned positive point values, responses indicating gay pride (e.g. *"I am very proud to be gay and make it known to everyone around me"*) were assigned negative point values, and neutral responses were assigned no points. The scale ranged from zero to 80, where a higher score represented a lower acceptance of respondents' homosexual behaviors, thoughts, and feelings, and decreased gay pride. Experiences of heteronormative social pressure were measured by creating an index scale of responses to 4 questions assessing the degree to which respondents felt obligated to live a heterosexual lifestyle by hiding their homosexuality, getting married, having children, and having sex with women. Responses for each question ranged from 1 to 5, and were summed, creating a total range from 4 to 20, with a higher score representing greater feelings of heteronormative social pressure.

The analysis examines the extent to which sexual behavior and experiences of homophobic discrimination and social pressures influence perceptions of HIV seriousness, risk, and threat. To measure perceived HIV seriousness, risk, and threat, respondents were asked to rate their perceived seriousness of contracting HIV ("*How serious for you would it be if you*

contracted HIV?") on a scale from 1 (not at all serious) to 5 (very serious), their perceived risk of contracting HIV based on their current behavior ("*How would you rate your risk for contracting HIV based on your current behavior?")* on a scale from 1 (no risk) to 10 (very high risk), and their perceived inability to stay HIV-negative throughout their lifetime ("*How confident are you that you can stay HIV-negative in your lifetime?")* on a scale from 1 (will not have HIV by the end of his lifetime) to 5 (will have HIV by the end of his lifetime). These three questions provide the three outcomes for analysis, three continuous variables measuring 1) perceived seriousness of contracting HIV, 2) perceived risk of contracting HIV, and 3) perceived inability to stay HIV-negative.

Data were analyzed using STATA 12 [35]. Only participants reporting having ever been tested for HIV and having had a known HIV-negative status were included in analysis. Three separate linear regression models were fitted for each of the three outcomes in each of the 7 countries. Key covariates for analysis included: age (categorized as 18-24, 25-34, 35-44, and ≥45), education (dichotomized as receiving a secondary school education or less (≤12 years) or receiving higher education (>12 years)), and race/ancestry(categorized differently in each country: White or Other (Brazil, Canada, U.S., UK); Thai or Other (Thailand); White, Aboriginal, or Other (Australia); and White African, Black African, or Other (RSA)). Age of sexual debut was categorized into 3 groups: ≤15 years, 16-20 years, >20 years. Drug use was defined as any non-prescription drug use in the previous 12 months versus none. Relationship status was defined as being in a relationship with a man versus no relationship; respondents reporting a relationship with a woman were classified as single. Respondents' proportion of protected versus all anal intercourse partners in the previous year was calculated by dividing their number of unprotected anal intercourse partners by their number of total anal intercourse partners, which gave their percentage of anal intercourse partners which were protected. Subtracting this number from 100 provided the percentage of protected versus all anal intercourse partners in the previous year, and was categorized as never having had anal intercourse or always having had protected

anal intercourse, 99%-50% protected anal intercourse, 1%-49% protected anal intercourse, and never having had (0%) protected anal intercourse. Respondents' proportion of lifetime anal intercourse partners that were encountered in the previous year was calculated by dividing respondents' number of anal intercourse partners encountered in the previous year by their number of lifetime anal intercourse partners, and were categorized into discrete groups of never having had anal intercourse or 100% of encounters having been in the previous year, 99%-50% of partners having been in the previous year, 1%-49% of partners having been in the previous year, and 0% of partners being in the previous year (not having had anal intercourse in the previous year). The time since respondents' last HIV test was calculated by comparing the month and year of respondents' most recent HIV test to their dates of survey completion, and were categorized into discrete groups of ≤6 months, 7-12 months, 1-2 years, and >2 years. Key covariates of interest in all models were the three measures of external, internal, and social pressure, the percentage of respondents' protected versus all anal intercourse partners in the previous year, respondents' proportion of lifetime anal intercourse partners encountered in the previous year, and time since the respondents' most recent HIV test.

Results

Demographic characteristics of the sample as well as mean index scores for experiences of homophobic discrimination, internalized homophobia, experiences of heteronormative social pressure, perceived seriousness of contracting HIV, perceived risk of contracting HIV, and perceived inability to stay HIV negative throughout respondents' lifetime are summarized in Table 1. In all countries, the majority of the sample was between the ages of 18-24 (except South Africa and Thailand), with the majority reporting 12 or more years of education, and being of White/European/Thai race/ancestry. Moreover, the majority of all respondents reported being in a relationship with a man, no recent drug use (except Canada, where 50.67% reported recent drug use), and reported having 1-49% of their lifetime anal intercourse partners in the previous year.

The variations in respondents' perceived seriousness of contracting HIV, perceived risk of contracting HIV, and perceived inability to remain HIV negative throughout their lifetimes by covariates are reported in Table 2. Overall, mean perceived seriousness of contracting HIV ranged from 4.29 (SD: 0.09) in Thailand to 4.73 (SD: 0.05) in the U.S, mean perceived risk of contracting HIV ranged from 2.69 (SD: 0.14) in Canada to 3.55 (SD: 0.19) in Thailand, and mean perceived inability to remain HIV negative throughout respondents' lifetimes ranged from 1.62 (SD: 0.06) in Canada to 2.18 (SD: 0.10) in Thailand.

Results from the linear regression analysis are shown in Table 3. Few covariates were consistently significantly associated with respondents' perceived seriousness of HIV across countries (Table 3). Compared to respondents aged 18-24, respondents aged 35-44 and ≥45 in Australia and the UK and respondents aged ≥45 years in Canada reported a significantly lower perceived seriousness of HIV (Australia 35-44, β:-0.60, p=0.004; Australia ≥45, β: -0.43, p=0.046; UK 35-44, β: -0.45, p=0.008; UK ≥45, β:-0.53, p=0.004; Canada, β: -0.54, p=0.016). Other covariates, such as race, age of sexual debut, and patterns of sexual risk taking varied in significance across countries. Respondents of a minority race in Thailand reported a significantly lower perceived seriousness of HIV compared to respondents of Thai race (β: -0.99, p=0.044), and respondents in Canada who reported an age of sexual debut >20 years reported a significantly higher perceived seriousness of HIV compared to respondents reporting an age of sexual debut ≤15 years (β: 0.55, p=0.011). Compared to respondents who reported not having anal intercourse in the previous year or who reported having protected intercourse with 100% of anal sex partners, respondents in Brazil who reported having protected anal intercourse with 99%-50% of anal sex partners reported a significantly higher perceived seriousness of contracting HIV (β: 0.30, p=0.034), and respondents in the UK who reported having protected anal intercourse with 1-49% of anal sex partners in the previous year reported a significantly lower perceived seriousness of contracting HIV (β: -0.82, p=0.001). Lastly, compared to respondents whose most recent HIV test was ≤6 months prior to survey enumeration, respondents in the UK whose most recent HIV

test was either 7-12 months or 1-2 years prior to survey enumeration reported a significantly lower perceived seriousness of contracting HIV(7-12 months, β: -0.34, p=0.02; 1-2 years, β: -0.27, p=0.06).

Comparatively more covariates were consistently significantly associated with respondents' perceived risk of contracting HIV across countries, namely, age, recent drug use, reporting a sexual relationship, patterns of sexual risk-taking, and internalized homophobia. Age had varied associations with respondents' perceived risk of contracting HIV; compared to respondents aged 18-24, Australian and Canadian respondents aged 35-44 reported significantly higher perceived risks of contracting HIV (Australia, β: 0.85, p=0.047; Canada, β: 1.38, p=0.002), while British respondents aged 35-44 and American respondents aged 25-34 and ≥45 years reported lower perceived risks of contracting HIV (UK, β: -1.11, p=0.006; U.S. 25-34, β: -1.25, p=0.005; U.S. ≥45 , β: -1.18, p=0.015). Respondents in Canada, South Africa, and the UK who reported drug use in the previous 12 months reported significantly higher perceived risks of contracting HIV compared to respondents who reported no drug use (Canada, β: 0.86, p=p=0.001; South Africa, β: 0.76, p=0.004; UK, β: 0.60, p=0.031). Respondents in Australia, Canada, the UK and the U.S. who reported being in a relationship reported significantly lower perceived risks of contracting HIV than single respondents (Australia, β: -0.94, p=0.001; Canada, β: -0.64, p=0.033; UK, β: 0.60, p=0.008).

Respondents' perception of risk showed a non-linear association with their sexual risk taking. In all countries except Canada, respondents' proportion of protected versus all anal intercourse partners in the previous year was significantly associated with respondents' perceived risk of contracting HIV. Respondents who reported having protected anal intercourse with 99-50% or 1-49% of their anal sex partners in the previous year correctly reported significantly higher perceived risks of contracting HIV than respondents reporting having no anal intercourse or having protected intercourse with 100% of anal sex partners in the previous year. Respondents who reported never having protected anal intercourse with any of their anal sex partners in the

previous year reported lower perceived risks of contracting HIV, however, this association was not significant. Compared to respondents who reported not having anal intercourse in the previous year or who reported all lifetime anal intercourse partners being encountered in the previous year, respondents in Australia who reported 99-50% of lifetime anal intercourse partners being encountered in the previous year and respondents in Brazil, Thailand, and the U.S. who reported 1-49% of lifetime anal intercourse partners being encountered in the previous year were significantly more likely to report higher perceived risks of contracting HIV. Of the 3 index measures of homophobia, the only index to show a significant association with perceived HIV risk was internalized homophobia, where respondents in Brazil, South Africa, and the U.S. who reported higher internalized homophobia scores were associated with a significantly higher perceived risk of contracting HIV (Brazil, β: 0.03, p=0.04; South Africa, β: 0.04, p=0.006; U.S, β: 0.04, p=0.019).

Fewer covariates were significantly associated with respondents' perceived inability to remain HIV negative through their lifetimes in multiple countries, and significant associations were often varied, namely age of sexual debut and the ratio of protected versus all anal intercourse partners in the previous year. Compared to respondents whose age of sexual debut was ≤15 years, respondents in South Africa whose age of sexual debut was between 16-19 years had significantly lower perceived inabilities to remain HIV negative (β: -0.26, p=0.035), while respondents in Thailand whose age of sexual debut was between 16-19 years had significantly higher perceived inabilities to remain HIV negative (β: 0.60; p=0.023). Respondents' proportion of protected versus all anal intercourse partners in the previous year showed a significant positive association with respondents' perceived inability to remain HIV negative throughout their lifetimes in Canada, South Africa, Thailand, and the UK. Respondents in Thailand reporting having protected intercourse with 99-50% of all anal sex partners in the previous year and respondents in South Africa and the UK who reported having protected intercourse with 1-49% of all anal sex partners in the previous year reported significantly higher perceived inabilities to

remain HIV negative throughout their lifetimes compared to respondents reporting having no anal intercourse or having 100% protected anal intercourse in the previous year. Respondents in Canada reporting having protected intercourse with 99-50% of all anal sex partners reported significantly lower perceived inabilities to remain HIV negative than respondents reporting 100% protected or no anal intercourse.

Some covariates were significantly associated with respondents' perceived inability to remain HIV negative throughout their lifetimes in only one country, specifically, race, drug use, relationship status, percent of lifetime anal intercourse partners encountered in the previous year, and time since respondents' most recent HIV test. Respondents in Canada reporting drug use in the previous year reported significantly higher perceived inabilities to remain HIV negative (β: 0.29, p=0.012), and respondents in Australia reporting a relationship reported significantly lower perceived inabilities to remain HIV negative (β: -0.39, p=0.008). Compared to respondents whose most recent HIV test was ≤6 months prior to survey enumeration, respondents in South Africa whose most recent HIV test was 7-12 months prior survey enumeration reported significantly higher perceived inabilities to remain HIV negative (β: 0.29, p=0.048), while respondents in Canada whose most recent HIV test was 1-2 years prior to survey enumeration reported a significantly lower perceived inabilities to remain HIV negative (β: -0.46, p=0.006). Again, of the 3 index measures of homophobia, the only index to show a significant association with perceived HIV risk was internalized homophobia, where respondents in South Africa and the UK reporting higher internalized homophobia scores were reported significantly higher perceived inabilities to remain HIV negative throughout their lifetimes (South Africa, β: 0.01, p=0.041; UK, β: -0.01, p=0.028).

Discussion

Studies of HIV risk behaviors among MSM have largely focused on factors associated with participating in risk-taking, often in the form of individual characteristics, and have largely

ignored factors shaping MSM perceptions of HIV risk. In particular, few studies have examined HIV risk perceptions of MSM in international settings, and no previous research has attempted to quantify the HIV risk perceptions of HIV-negative MSM and compare these across socially and culturally contrasting countries. The results of this current study point to the influence of sexual behaviors, relationships, and age on the individual reporting of perceived HIV seriousness, risk of HIV seroconversion, and lifetime threat of HIV seroconversion among MSM in seven culturally and economically diverse settings.

Reporting increased sexual risk taking was associated with perceptions of increased risk for HIV seroconversion (all countries except for Thailand) and greater inability to remain HIV negative (South Africa, Thailand, and the UK). These findings contradict previous research that has suggested that MSM engaging in high risk activities often underestimate their risk for HIV infection [12-15]. Rather, our results demonstrate that respondents engaging in risky sexual behaviors largely correctly perceive themselves to be at higher risk for HIV seroconversion. The finding that MSM continue to engage in high-risk sexual behaviors despite personal awareness of their increased risk and threat of HIV seroconversion suggests that the perceived risk of HIV may not outweigh the anticipated pleasure, connectedness, and intimacy UAI provides, which has also been demonstrated in other studies [36, 37]. Additionally, research has suggested that MSM employ various manifestations of cognitive dissonance to cope with the contradiction of engaging in risky sex despite awareness of the risk for HIV transmission [36, 38]. These include beliefs of invincibility, self-justification of behaviors, and mental/temporal compartmentalization of the risk separate from the behavior, and simply acknowledging and accepting the contradiction [36, 38]. However, this also assumes that the individual had the agency to participate in safer sex: it is possible that some MSM may face structural barriers (lack of access to condoms) or dyadic barriers (partners unwilling to use a condom or intimate partner violence) that prevented them from using condoms. Moreover, while our results demonstrated that respondents more frequently engaging in UAI had significantly higher perceived risks and threats of HIV seroconversion

compared to respondents never engaging in UAI, HIV risk and threat perceptions were generally low across all countries and covariates. On a scale from 1 (low) to 10 (high), with the exception of Thailand, perceived HIV risk never exceeded 4.81 (respondents in South Africa reporting engaging in protected anal intercourse with 1-49% of partners in the previous year) and on a scale from 1 to 5, perceived inability to remain HIV negative never exceeded 2.67 (respondents in the UK reporting engaging in protected anal intercourse with 1-49% of partners in the previous year). This suggests that while MSM engaging in risky behaviors perceive themselves to be at some degree of increased risk compared to MSM not engaging in risky behaviors, they still may perceive their risk to be lower than it actually is.

Respondents in relationships perceived significantly lower risks of HIV seroconversion (Australia, Canada, the UK, and the U.S.) and significantly higher ability to remain HIV negative throughout their lifetimes (Australia) compared to single respondents. The belief that being in a relationship is protective against HIV is a common misconception, and may stem from the trust, intimacy, and commitment present in many partnerships. However, the perceived protection provided by relationships may in fact lead to increased risk behaviors. For example, Darbes et al (2012) found that increased levels of general social support between partners were significantly associated with increased odds of UAI with outside partners, possibly because supportive partners may be more understanding and lenient of their partners' behaviors. Previous studies have demonstrated the protective effects of relationships against other harmful outcomes among MSM, such as internalized homophobia [40, 41], drug use [42], and frequent/heavy alcohol use [43]. However, current research suggests that the majority of incident HIV infections among MSM actually result from intercourse with a main partner [44-47], a pattern driven by more frequent anal intercourse and more infrequent condom use between main partners relative to casual partners [44, 46, 48]. Yet, literature investigating HIV transmission between MSM in main partnerships in international settings is at a nascent stage. Our findings suggest that the perception that relationships are protective against the risk of HIV transmission is universal, and points to the

need for interventions to tackle this misconception, and intervention efforts to take a dyadic approach to HIV prevention. One valuable HIV prevention intervention for MSM could be couples HIV voluntary counseling and testing (CVCT). The effectiveness of CVCT as a tool for decreasing sexual risk taking, increasing consistent condom use, and reducing HIV transmission has been demonstrated among sero-discordant heterosexual couples in Sub-Saharan Africa [49-52]. Recent research suggests that MSM worldwide, particularly those in main partnerships, are accepting of CVCT and willing to use it as an HIV prevention tool [53-55].

We found that older respondents reported a significantly lower perceived risk (the UK and the U.S.) and seriousness (Australia, Canada, and the UK) of contracting HIV/AIDS than younger respondents. We may see a lower perceived risk and seriousness of contracting HIV/AIDS among older MSM because they do not engage in risk behaviors such as drug and alcohol use as frequently as younger MSM [56]. Also, because older MSM frequent gay-related venues at lower rates than younger MSM, they are exposed to fewer HIV risk messages. Our findings may also reflect some degree of treatment optimism. Unlike younger MSM, older MSM witnessed the devastating effects of AIDS prior to the advent of HAART. Consequently, older MSM may now perceive AIDS to be less serious, as it has become a manageable illness rather than the death sentence they once knew it to be. Nonetheless, the findings that older MSM perceive a significantly lower HIV risk and seriousness should be of concern. Thanks to HAART, HIV-positive MSM are living through old age; consequently the HIV/AIDS prevalence among older MSM is higher than the prevalence among young MSM in many places [57, 58]. Numerous studies have identified having older MSM sex partners to be an independent risk factor for HIV transmission [59, 60] because older MSM have had more lifetime sexual partners and more lifetime sexual encounters, thus they have had more opportunities for HIV seroconversion. Also, older MSM do not test for HIV as frequently as their younger counterparts [61, 62].

Respondents reporting higher internalized homophobia scores reported significantly higher perceived risks of HIV sero-conversion (Brazil, South Africa, and the U.S.) and

significantly higher perceived inabilities to remain HIV sero-negative (South Africa and the UK). Low self-esteem among internally homophobic MSM may confer a sense of hopelessness which manifests as a lack of desire to keep themselves safe, or a lack of self-efficacy in taking measures to remain HIV sero-negative. Additionally, internally homophobic MSM may be less affiliated with the gay community. Such marginalization may inhibit their access to information, resources, and services that promote safe sexual behaviors. Moreover, internally homophobic MSM may feel less comfortable disclosing their same-sex sexual behaviors to their health care providers, which inhibits their ability to confront any risk behaviors and make an action plan to reduce their risk for HIV sero-conversion.

There are important limitations to the present study, most of which result from its internet-based sampling design. In all countries, the survey was advertised only to men who were registered users of Facebook and had a profile indicating an interest in men. Consequently, MSM who are more open about their sexuality may be oversampled, leading to less representation of those experiencing homophobic discrimination and internalized homophobia, two key covariates in our analysis. Furthermore, a significant proportion of those who clicked on the banner ads did not complete the survey: we do not have data on their characteristics to establish the extent of this selectivity bias. Previous studies suggest that MSM who participate in research are generally non-representative of the larger MSM community; they tend to be better educated, more open about their sexualities, and more likely to be white [56]. These characteristics are certainly reflected in our sample. Lastly, because of the cross-sectional survey design, we cannot make causal inferences between our covariates and outcomes. Despite these limitations, however, this study demonstrated the usefulness of an internet-based survey tool in reaching traditionally hard-to-reach populations, and for collecting standardized data across economically and culturally diverse settings.

Conclusion

While MSM engaging in risky sexual behaviors correctly perceive themselves to have greater risks for HIV seroconversion and have diminished abilities to remain HIV-negative throughout their lifetimes, reporting of risks of HIV infection were still generally low across MSM sampled in all countries. The results point to the need for HIV prevention messages to continue to focus on the HIV risks of unsafe sex, and that such messages may need to be packaged differently for men in relationships and for older men. Additionally, novel strategies for MSM to understand the true risks of unsafe sex and to surmount the effects of behavioral discordance are still needed.

Table 1: Background Demographic Characteristics by Country							
Variable	**Australia[§] (n=233)**	**Brazil (n=247)**	**Canada (n=223)**	**South Africa[ǂ] (n=330)**	**Thailand* (n=165)**	**UK (n=237)**	**US (n=217)**
Age							
18-24 years	41.2%	57.5%	29.6%	23.9%	24.9%	40.9%	47.5%
25-34 years	28.3%	28.3%	29.6%	37.9%	53.9%	28.7%	22.2%
35-44 years	15.9%	10.5%	17.0%	20.3%	18.2%	16.5%	9.2%
≥45 years	14.6%	3.6%	23.8%	17.9%	3.0%	13.9%	21.2%
Education							
≤ 12 years	36.9%	32.0%	24.2%	30.3%	17.0%	21.1%	25.4%
> 12 years	63.1%	68.0%	75.8%	69.7%	83.0%	78.9%	74.7%
Race							
White/European[§]/Thai*	39.9%	63.6%	81.2%	87.6%	95.8%	94.1%	85.7%
Aboriginal[§]/Black[ǂ]	30.5%	--	--	6.4%	--	--	--
Other	29.6%	36.4%	18.8%	6.1%	4.2%	5.9%	14.3%
Age of Sexual Debut							
≤ 15 years	38.2%	59.5%	38.6%	41.2%	42.4%	48.1%	41.5%
16-19 years	47.6%	32.8%	45.3%	38.5%	32.7%	43.9%	44.2%
> 20 years	14.2%	7.7%	16.1%	20.3%	24.9%	8.0%	14.3%
Drug Use in Last Year							
Yes	45.5%	32.4%	50.7%	42.4%	29.1%	36.3%	36.9%
No	54.5%	67.6%	49.3%	57.6%	70.9%	63.7%	63.1%
Relationship Status							
In a relationship	56.2%	50.6%	64.6%	59.4%	54.6%	56.1%	56.2%
Single	43.8%	49.4%	35.4%	40.6%	45.5%	43.9%	43.8%
Percent of Protected versus all Anal Intercourse Partners in Previous Year							
Never anal or 100% protected	24.5%	24.7%	29.6%	23.3%	32.7%	28.7%	28.6%
99-50% protected	30.9%	43.3%	29.6%	21.2%	33.9%	28.7%	18.4%
1-49% protected	7.7%	6.9%	3.6%	6.4%	3.6%	6.3%	8.8%
Never protected	36.9%	25.1%	37.2%	49.1%	29.7%	36.3%	44.2%
Percent of Lifetime Anal Sex Partners Encountered in Previous Year							
Never anal or 100% of partners	5.6%	9.3%	7.6%	4.2%	18.2%	8.4%	13.4%
99-50% of partners	12.0%	15.0%	11.2%	14.2%	8.5%	11.4%	11.1%
1-49% of partners	75.1%	74.1%	67.3%	73.9%	63.6%	73.0%	61.3%
0% of partners	7.3%	1.6%	13.9%	7.6%	9.7%	7.2%	14.3%
Time Since Most Recent HIV Test							
≤ 6 months	44.6%	42.1%	37.7%	43.9%	2.4%	57.8%	41.5%
7-12 months	18.9%	20.7%	22.4%	20.3%	31.5%	18.1%	20.3%
1-2 years	16.7%	19.4%	17.0%	17.3%	34.6%	18.1%	18.0%

> 2 years	19.7%	17.8%	22.9%	18.5%	31.5%	5.9%	20.3%
External Homophobic Discrimination (mean/sd)	5.36 (0.16)	5.82 (0.14)	5.43 (0.17)	5.97 (0.13)	3.99 (0.16)	5.01 (0.15)	5.28 (0.17)
Internalized Homophobia (mean/sd)	14.89 (0.80)	16.19 (0.71)	14.00 (0.73)	12.43 (0.53)	25.86 (0.94)	11.98(0.66)	12.88 (0.76)
Experiences of Heteronormative Social Pressure (mean/sd)	6.58 (0.22)	8.13 (0.27)	6.99 (0.24)	7.10 (0.23)	9.80 (0.42)	6.42 (0.22)	7.38 (0.27)
Perceived Seriousness of Contracting HIV	4.59 (0.06)	4.58 (0.05)	4.57 (0.07)	4.41 (0.06)	4.29 (0.09)	4.55 (0.06)	4.73 (0.05)
Perceived Risk of Contracting HIV	3.00 (0.14)	3.40 (0.15)	2.69 (0.14)	3.04 (0.13)	3.55 (0.19)	2.78 (0.13)	2.99 (0.16)
Perceived Inability to Stay HIV Negative Throughout Life	1.78 (0.06)	2.15 (0.07)	1.62 (0.06)	1.83 (0.06)	2.18 (0.10)	1.77 (0.06)	1.82 (0.07)

Table 2: Respondents' Perceived Seriousness of Contracting HIV Across 7 Countries							
Variable	**Australia[§]**	**Brazil**	**Canada**	**South Africa[ǂ]**	**Thailand***	**UK**	**US**
Age							
18-24 years	***4.81***	4.59	***4.76***	***4.48***	4.56	***4.73***	4.82
25-34 years	***4.61***	4.66	***4.59***	***4.64***	4.16	***4.63***	4.67
35-44 years	***4.14***	4.42	***4.71***	***4.13***	4.3	***4.28***	4.85
> 45 years	***4.44***	4.22	***4.19***	***4.12***	4.4	***4.18***	4.57
Education							
≤ 12 years	4.58	4.64	4.59	4.42	4.36	***4.32***	4.75
> 12 years	4.60	4.55	4.56	4.40	4.28	***4.61***	4.73
Race							
White/European[§]/Thai*	4.65	63.56	4.60	4.41	4.32	4.54	4.73
Aboriginal[§]/Black[ǂ]	4.49	--	--	4.05	--	--	--
Other	4.62	36.44	4.40	4.75	3.58	4.71	4.74
Age of Sexual Debut							
≤ 15 years	4.49	4.58	***4.29***	4.32	4.26	4.47	4.74
16-19 years	4.69	4.59	***4.72***	4.41	4.41	4.61	4.75
> 20 years	4.51	4.53	***4.78***	4.58	4.20	4.74	4.65
Drug Use in Last Year							
Yes	4.58	4.58	4.62	4.48	4.48	***4.34***	4.73
No	4.60	4.58	4.51	4.35	4.21	***4.68***	4.74
Relationship Status							
In a relationship	4.64	4.54	4.61	4.33	4.20	4.47	4.72
Single	4.53	4.61	4.48	4.52	4.40	4.65	4.75
Percent of Protected versus all Anal Intercourse Partners in Previous Year							
Never anal or 100% protected	4.58	4.46	4.41	4.38	4.13	***4.57***	4.71
99-50% protected	4.69	4.69	4.64	4.27	4.41	***4.66***	4.95
1-49% protected	4.50	4.47	5.00	3.95	5.00	***3.73***	4.89
Never protected	4.53	4.53	4.59	4.54	4.24	***4.59***	4.63
Percent of Lifetime Anal Sex Partners Encountered in Previous Year							
Never anal or 100% of partners	4.58	4.39	***4.71***	4.71	4.33	***4.85***	4.62
99-50% of partners	4.69	4.65	***4.96***	4.55	4.86	***4.85***	4.88
1-49% of partners	4.50	4.59	***4.55***	4.35	4.21	***4.46***	4.74
0% of partners	4.53	4.50	***4.23***	4.48	4.25	***4.71***	4.68
Time Since Most Recent HIV Test							
≤ 6 months	4.53	4.58	4.48	4.42	4.00	4.66	4.74
7-12 months	4.89	4.65	4.62	4.27	4.25	4.37	4.75
1-2 years	4.59	4.56	4.55	4.46	4.21	4.40	4.77
> 2 years	4.46	4.52	4.67	4.48	4.44	4.57	4.66

Table 2, continued: Respondents' Perceived Risk of Contracting HIV Across 7 Countries							
Variable	**Australia[§]**	**Brazil**	**Canada**	**South Africa[ǂ]**	**Thailand***	**UK**	**US**
Age							
18-24 years	***3.28***	***3.16***	***2.68***	3.22	3.02	2.99	***3.52***
25-34 years	***2.74***	***3.90***	***2.55***	3.22	3.74	2.90	***2.56***
35-44 years	***3.70***	***3.81***	***3.47***	2.73	3.53	1.95	***3.25***
> 45 years	***1.97***	***2.00***	***2.30***	2.76	4.60	2.88	***2.13***
Education							
≤ 12 years	3.21	3.51	2.41	2.90	3.54	2.94	3.05
> 12 years	2.88	3.35	2.78	3.10	3.55	2.73	2.97
Race							
White/European[§]/Thai*	3.14	3.34	2.61	***2.84***	3.58	2.78	2.97
Aboriginal[§]/Black[ǂ]	3.06	--	--	***4.43***	--	--	--
Other	2.77	3.49	3.00	***4.35***	3.00	2.64	3.10
Age of Sexual Debut							
≤ 15 years	***3.48***	3.49	2.43	3.15	3.59	2.91	3.13
16-19 years	***2.83***	3.27	3.01	2.98	3.41	2.62	2.94
> 20 years	***2.30***	3.21	2.39	2.91	3.69	2.84	2.74
Drug Use in Last Year							
Yes	***3.35***	3.48	***3.21***	***3.44***	3.98	***3.30***	***3.50***
No	***2.72***	3.36	***2.15***	***2.73***	3.38	***2.48***	***2.69***
Relationship Status							
In a relationship	***2.53***	3.14	2.51	2.91	3.67	***2.48***	***2.58***
Single	***3.62***	3.66	3.00	3.22	3.41	***3.15***	***3.52***
Percent of Protected versus all Anal Intercourse Partners in Previous Year							
Never anal or 100% protected	***2.51***	***2.69***	***2.26***	***2.47***	***2.91***	***2.28***	***2.21***
99-50% protected	***3.82***	***3.77***	***3.33***	***3.46***	***4.09***	***3.35***	***3.88***
1-49% protected	***4.5***	***4.41***	***3.88***	***4.81***	***6.33***	***4.47***	***4.53***
Never protected	***2.34***	***3.18***	***2.40***	***2.90***	***3.31***	***2.42***	***2.82***
Percent of Lifetime Anal Sex Partners Encountered in Previous Year							
Never anal or 100% of partners	***2.51***	3.04	2.88	***3.07***	***4.24***	2.55	***2.90***
99-50% of partners	***3.82***	3.24	2.24	***3.91***	***3.45***	2.93	***3.29***
1-49% of partners	***4.5***	3.46	2.93	***2.97***	***3.5***	2.88	***3.23***
0% of partners	***2.34***	4.00	1.77	***2.04***	***3.84***	1.76	***1.81***
Time Since Most Recent HIV Test							
≤ 6 months	***3.54***	3.37	3.08	3.17	3.75	2.74	***3.37***
7-12 months	***2.86***	3.06	2.76	3.31	3.25	2.86	***2.86***
1-2 years	***2.92***	3.35	2.45	2.72	3.89	3.16	***3.21***
> 2 years	***2.00***	3.91	2.14	2.72	3.46	1.64	***2.16***

Table 2, continued: Respondents' Perceived Inability to Stay HIV Negative Throughout His Lifetime Across 7 Countries							
Variable	**Australia[§]**	**Brazil**	**Canada**	**South Africa[ǂ]**	**Thailand***	**UK**	**US**
Age							
18-24 years	1.76	2.08	1.61	1.91	2.24	1.68	1.91
25-34 years	1.71	2.21	1.59	1.78	2.16	1.85	1.75
35-44 years	2.11	2.38	1.82	1.93	2.13	1.74	1.75
> 45 years	1.59	2.11	1.55	1.71	2.20	1.91	1.74
Education							
≤ 12 years	1.79	2.06	1.44	1.72	2.25	1.80	1.78
> 12 years	1.77	2.20	1.68	1.88	2.16	1.76	1.84
Race							
White/European[§]/Thai*	1.78	2.22	1.64	***1.78***	2.15	1.77	1.78
Aboriginal[§]/Black[ǂ]	1.73	--	--	***2.00***	--	--	--
Other	1.81	2.03	1.57	***2.35***	2.71	1.86	2.06
Age of Sexual Debut							
≤ 15 years	1.84	2.28	1.60	1.93	2.13	1.74	1.89
16-19 years	1.77	1.94	1.67	1.72	2.41	1.81	1.81
> 20 years	1.61	2.11	1.53	1.84	1.95	1.79	1.68
Drug Use in Last Year							
Yes	1.87	2.14	***1.75***	1.87	2.18	***1.93***	1.88
No	1.70	2.18	***1.49***	1.80	2.17	***1.68***	1.80
Relationship Status							
In a relationship	***1.63***	2.28	1.60	1.76	2.05	1.74	***1.70***
Single	***1.97***	2.03	1.66	1.93	2.28	1.81	***1.99***
Percent of Protected versus all Anal Intercourse Partners in Previous Year							
Never anal or 100% protected	1.72	2.16	1.59	***1.82***	1.76	***1.66***	1.81
99-50% protected	1.96	2.15	1.68	***1.94***	2.55	***1.76***	1.95
1-49% protected	1.83	2.53	1.50	***2.52***	2.50	***2.67***	2.26
Never protected	1.65	2.05	1.61	***1.70***	2.16	***1.71***	1.70
Percent of Lifetime Anal Sex Partners Encountered in Previous Year							
Never anal or 100% of partners	1.72	2.00	***1.82***	1.71	2.27	1.70	1.59
99-50% of partners	1.96	2.32	***1.64***	1.94	1.79	1.63	1.54
1-49% of partners	1.83	2.13	***1.69***	1.84	2.26	1.80	1.92
0% of partners	1.65	2.50	***1.19***	1.64	1.81	1.76	1.84
Time Since Most Recent HIV Test							
≤ 6 months	1.94	2.13	***1.79***	1.74	3.00	1.77	***1.97***
7-12 months	1.57	1.90	***1.54***	2.01	2.12	1.91	***2.05***
1-2 years	1.59	2.27	***1.34***	1.86	2.07	1.84	***1.59***
> 2 years	1.76	2.39	***1.65***	1.82	2.29	1.14	***1.52***

Table 3: Respondents' Perceived Seriousness of Contracting HIV Across 7 Countries							
Variable	**Australia[§]**	**Brazil**	**Canada**	**South Africa[ŧ]**	**Thailand***	**United Kingdom**	**United States**
Age (ref: 18-24 years)							
25-34 years	-0.23 (-0.55, 0.10)	0.08 (-0.19, 0.35)	-0.23 (-0.61, 0.15)	0.18 (-0.15, 0.50)	-0.43 (-0.96, 0.11)	-0.16 (-0.43, 0.12)	-0.21 (-0.48, 0.07)
35-44 years	***-0.60 (-1.00, -0.20)***	-0.14 (-0.52, 0.24)	-0.16 (-0.62, 0.29)	-0.33 (-0.70, 0.05)	-0.16 (-0.84, 0.51)	***-0.45 (-0.78, -0.12)***	0.07 (-0.31, 0.45)
> 45 years	***-0.43 (-0.85, -0.01)***	-0.10 (-0.71, 0.50)	***-0.54 (-0.99, -0.10)***	-0.31 (-0.71, 0.08)	-0.57 (-1.82, 0.69)	***-0.53 (-0.88, -0.17)***	-0.26 (-0.55, 0.04)
Education (ref: ≤ 12 years)							
> 12 years	0.00 (-0.26, 0.27)	-0.05 (-0.28, 0.18)	-0.13 (-0.45, 0.20)	0.02 (-0.24, 0.29)	0.11 (-0.44, 0.66)	0.17 (-0.11, 0.45)	-0.12 (-0.35, 0.11)
Race (ref: European[§]/White/Thai*)							
Aboriginal[§]/Black[ŧ]	-0.17 (-0.46, 0.13)	--	--	-0.43 (-0.95, 0.08)	--	--	--
Other	-0.07 (-0.39, 0.24)	0.08 (-0.14, 0.30)	-0.30 (-0.65, 0.05)	0.12 (-0.38, 0.63)	***-0.99 (-1.95, -0.03)***	0.05 (-0.41, 0.52)	-0.05 (-0.33, 0.22)
Age of Sexual Debut (ref: ≤ 15 years)							
16-19 years	0.14 (-0.14, 0.41)	0.00 (-0.23, 0.24)	0.29 (-0.03, 0.60)	0.07 (-0.20, 0.34)	-0.10 (-0.60, 0.40)	0.01 (-0.22, 0.25)	0.01 (-0.20, 0.23)
> 20 years	0.14 (-0.26, 0.55)	-0.02 (-0.44, 0.39)	***0.55 (0.13, 0.98)***	0.09 (-0.25, 0.43)	-0.02 (-0.55, 0.52)	0.12 (-0.31, 0.55)	0.00 (-0.32, 0.31)
Drug Use in Last Year (ref: No drug use)							
Yes	0.09 (-0.18, 0.36)	0.01 (-0.21, 0.24)	0.08 (-0.20, 0.35)	0.11 (-0.14, 0.36)	0.40 (-0.05, 0.85)	-0.23 (-0.46, 0.00)	-0.11 (-0.32, 0.10)
Relationship Status (ref: Single)							
In a relationship	0.20 (-0.06, 0.47)	-0.04 (-0.26, 0.18)	0.23 (-0.07, 0.54)	-0.22 (-0.49, 0.04)	-0.19 (-0.59, 0.21)	-0.18 (-0.41, 0.04)	0.07 (-0.14, 0.29)
Percent of Protected versus all Anal Intercourse Partners in Previous Year (ref: Never anal or 100% protected)							
99-50% protected	0.01 (-0.37, 0.38)	***0.30 (0.02, 0.59)***	-0.10 (-0.53, 0.34)	-0.14 (-0.54, 0.27)	0.31 (-0.28, 0.89)	0.09 (-0.22, 0.40)	0.22 (-0.14, 0.57)
1-49% protected	-0.27 (-0.81, 0.27)	0.02 (-0.44, 0.48)	0.24 (-0.55, 1.03)	-0.48 (-1.05, 0.09)	0.54 (-0.56, 1.64)	***-0.82 (-1.31, 0.34)***	0.16 (-0.25, 0.57)
Never protected	-0.11 (-0.49, 0.27)	0.13 (-0.18, 0.44)	-0.14 (-0.56, 0.28)	0.15 (-0.21, 0.52)	0.30 (-0.27, 0.86)	0.19 (-0.11, 0.49)	-0.16 (-0.47, 0.16)
Percent of Lifetime Anal Sex Partners Encountered in Previous Year (ref: Never anal or 100% of partners)							
99-50% of partners	0.41 (-0.24, 1.06)	0.29 (-0.16, 0.74)	0.22 (-0.41, 0.85)	-0.08 (-0.77, 0.60)	0.34 (-0.48, 1.17)	0.03 (-0.46, 0.52)	0.18 (-0.22, 0.58)
1-49% of partners	0.16 (-0.41, 0.74)	0.28 (-0.11, 0.66)	0.06 (-0.49, 0.61)	-0.24 (-0.85, 0.38)	-0.03 (-0.59, 0.53)	-0.11 (-0.53, 0.31)	0.20 (-0.12, 0.52)
0% of partners	0.32 (-0.46, 1.10)	0.29 (-0.64, 1.22)	-0.27 (-1.02, 0.48)	-0.16 (-0.95, 0.64)	0.14 (-0.79, 1.07)	0.20 (-0.44, 0.83)	0.10 (-0.38, 0.58)
Time Since Most Recent HIV Test (ref: ≤ 6 months)							
7-12 months	0.32 (-0.03, 0.67)	0.08 (-0.20, 0.36)	0.19 (-0.17, 0.55)	-0.20 (-0.52, 0.13)	0.18 (-1.11, 1.46)	***-0.34 (-0.63, -0.05)***	0.05 (-0.22, 0.31)

1-2 years	0.10 (-0.25, 0.45)	-0.01 (-0.30, 0.27)	0.16 (-0.23, 0.56)	0.07 (-0.28, 0.41)	0.04 (-1.24, 1.32)	***-0.27 (-0.56, 0.01)***	0.14 (-0.13, 0.42)
> 2 years	0.05 (-0.31, 0.40)	0.01 (-0.30, 0.32)	0.34 (-0.04, 0.72)	0.10 (-0.23, 0.43)	0.38 (-0.92, 1.67)	-0.23 (-0.69, 0.22)	0.09 (-0.19, 0.37)
External Homophobic Discrimination (mean, sd)	0.01 (0.03)	0.05 (0.02)	0.02 (0.03)	0.03 (0.03)	-0.05 (0.05)	***0.06 (0.02)***	0.03 (0.02)
Internalized Homophobia (mean, sd)	0.00 (0.01)	0.00 (0.01)	0.01 (0.01)	0.01 (0.01)	0.01 (0.01)	0.01 (0.01)	0.00 (0.00)
Experiences of Heteronormative Social Pressure (mean, sd)	-0.02 (0.02)	***0.03 (0.01)***	-0.02 (0.02)	0.01 (0.02)	0.02 (0.02)	-0.02 (0.02)	0.00 (0.02)

Table 3, continued: Respondents' Perceived Risk of Contracting HIV Across 7 Countries
Logistic Regression results, including beta coefficients and 95% confidence intervals. ***Bold Italics*** indicate significance at α=0.05

Variable	Australia[§]	Brazil	Canada	South Africa[‡]	Thailand*	United Kingdom	United States
Age (ref: 18-24 years)							
25-34 years	-0.01 (-0.69, 0.67)	0.68 (-0.09, 1.44)	0.36 (-0.37, 1.09)	0.09 (-0.58, 0.76)	0.97 (-0.04, 1.98)	-0.21 (-0.88, 0.46)	***-1.25 (-2.12, -0.37)***
35-44 years	***0.85 (0.01, 1.68)***	0.87 (-0.22, 1.96)	***1.38 (0.51, 2.26)***	0.04 (-0.75, 0.82)	0.74 (-0.53, 2.01)	***-1.12 (-1.91, -0.32)***	-0.59 (-1.80, 0.62)
> 45 years	-0.72 (-1.59, 0.16)	-0.59 (-2.33, 1.14)	0.78 (-0.07, 1.63)	0.24 (-0.59, 1.06)	1.53 (-0.84, 3.91)	-0.03 (-0.88, 0.83)	***-1.18 (-2.13, -0.23)***
Education (ref: ≤ 12 years)							
> 12 years	-0.06 (-0.61, 0.49)	-0.24 (-0.90, 0.43)	0.29 (-0.34, 0.91)	0.21 (-0.35, 0.76)	-0.07 (-1.11, 0.97)	-0.52 (-1.19, 0.15)	-0.31 (-1.05, 0.42)
Race (ref: European[§]/White/Thai*)							
Aboriginal/Black	-0.21 (-0.83, 0.41)	--	--	***1.21 (0.14, 2.28)***	--	--	--
Other	-0.07 (-0.72, 0.57)	-0.12 (-0.75, 0.52)	0.42 (-0.25, 1.09)	***1.43 (0.38, 2.48)***	-0.04 (-1.86, 1.78)	-0.59 (-1.70, 0.52)	-0.62 (-1.51, 0.27)
Age of Sexual Debut (ref: ≤ 15 years)							
16-19 years	***-0.73 (-1.30, -0.15)***	-0.17 (-0.83, 0.50)	0.46 (-0.14, 1.06)	-0.43 (-0.99, 0.14)	0.16 (-0.79, 1.11)	-0.11 (-0.67, 0.45)	0.00 (-0.70, 0.70)
> 20 years	-0.81 (-1.66, 0.03)	-0.73 (-1.91, 0.46)	-0.28 (-1.09, 0.53)	-0.21 (-0.93, 0.50)	0.28 (-0.73, 1.29)	0.25 (-0.78, 1.28)	0.06 (-0.94, 1.07)
Drug Use in Last Year (ref: No drug use)							
Yes	-0.01 (-0.57, 0.56)	0.05 (-0.60, 0.70)	***0.86 (0.33, 1.39)***	***0.76 (0.24, 1.27)***	0.49 (-0.36, 1.35)	***0.60 (0.05, 1.15)***	0.48 (-0.18, 1.14)
Relationship Status (ref: Single)							
In a relationship	***-0.94 (-1.50, -0.38)***	-0.57 (-1.20, 0.07)	***-0.64 (-1.23, -0.05)***	-0.31 (-0.87, 0.25)	0.04 (-0.72, 0.80)	***-0.72 (-1.25, -0.19)***	***-0.95 (-1.63, -0.27)***
Percent of Protected versus all Anal Intercourse Partners in Previous Year (ref: Never anal or 100% protected)							
99-50% protected	***1.24 (0.45, 2.03)***	***1.43 (0.62, 2.23)***	0.65 (-0.20, 1.49)	0.79 (-0.06, 1.64)	***1.40 (0.30, 2.50)***	0.72 (-0.03, 1.46)	***1.43 (0.30, 2.55)***
1-49% protected	***1.89 (0.76, 3.02)***	***2.24 (0.93, 3.55)***	1.44 (-0.08, 2.95)	***1.95 (0.75, 3.14)***	***3.87 (1.79, 5.95)***	***1.84 (0.68, 3.00)***	***2.33 (1.00, 3.65)***
Never protected	0.22 (-0.57, 1.01)	0.83 (-0.06, 1.72)	0.10 (-0.71, 0.90)	0.54 (-0.23, 1.31)	0.43 (-0.63, 1.49)	0.12 (-0.60, 0.83)	0.88 (-0.12, 1.89)
Percent of Lifetime Anal Sex Partners in Last Year (ref: Never anal or 100% of partners)							
99-50% of partners	***1.41 (0.05, 2.78)***	0.75 (-0.54, 2.03)	-0.73 (-1.94, 0.48)	0.02 (-1.41, 1.46)	0.59 (-0.96, 2.15)	0.45 (-0.72, 1.63)	-0.14 (-1.42, 1.15)
1-49% of partners	0.67 (-0.52, 1.87)	***1.12 (0.03, 2.22)***	-0.35 (-1.41, 0.71)	-0.30 (-1.59, 0.99)	***1.26 (0.20, 2.32)***	0.37 (-0.63, 1.38)	***1.04 (0.02, 2.06)***
0% of partners	0.51 (-1.11, 2.14)	2.65 (-0.02, 5.32)	-0.92 (-2.36, 0.51)	-0.89 (-2.55, 0.78)	0.09 (-1.66, 1.85)	-0.72 (-2.24, 0.81)	0.33 (-1.22, 1.87)
Time Since Most Recent HIV Test (ref: ≤ 6 months)							
7-12 months	-0.37 (-1.09, 0.36)	-0.33 (-1.14, 0.48)	-0.19 (-0.88, 0.49)	0.16 (-0.51, 0.84)	0.03 (-2.39, 2.46)	0.22 (-0.46, 0.91)	-0.58 (-1.43, 0.27)

1-2 years	-0.10 (-0.83, 0.63)	-0.07 (-0.89, 0.76)	-0.57 (-1.32, 0.19)	-0.47 (-1.19, 0.24)	0.47 (-1.95, 2.89)	0.42 (-0.26, 1.10)	0.10 (-0.78, 0.98)
> 2 years	-0.68 (-1.42, 0.05)	0.53 (-0.36, 1.42)	***-0.79 (-1.51, -0.06)***	-0.38 (-1.07, 0.31)	0.04 (-2.41, 2.48)	-1.09 (-2.19, $-7x10^{-5}$)	-0.31 (-1.22, 0.59)
External Homophobic Discrimination (mean, sd)	0.08 (0.06)	-0.03 (0.07)	-0.02 (0.05)	0.01 (0.06)	0.02 (0.10)	0.01 (0.06)	0.05 (0.07)
Internalized Homophobia (mean, sd)	0.00 (0.01)	***0.03 (0.01)***	-0.01 (0.01)	***0.04 (0.01)***	-0.01 (0.01)	-0.01 (0.01)	***0.04 (0.02***)
Experiences of Heteronormative Social Pressure (mean, sd)	0.04 (0.05)	0.03 (0.04)	0.07 (0.04)	0.01 (0.04)	0.04 (0.03)	0.07 (0.05)	-0.06 (0.05)

Table 3, continued: Respondents' Perceived Inability to Stay HIV Negative Throughout His Lifetime Across 7 Countries							
Variable	**Australia[§]**	**Brazil**	**Canada**	**South Africa[ǂ]**	**Thailand***	**United Kingdom**	**United States**
Age (ref: 18-24 years)							
25-34 years	0.06 (-0.29, 0.41)	0.05 (-0.31, 0.42)	0.08 (-0.23, 0.39)	-0.13 (-0.43, 0.16)	0.16 (-0.39, 0.71)	0.11 (-0.21, 0.42)	-0.31 (-0.68, 0.06)
35-44 years	0.39 (-0.04, 0.81)	0.28 (-0.24, 0.81)	0.25 (-0.13, 0.62)	0.06 (-0.28, 0.40)	0.37 (-0.32, 1.06)	0.02 (-0.36, 0.40)	-0.41 (-0.93, 0.11)
> 45 years	-0.03 (-0.48, 0.42)	-0.23 (-1.06, 0.60)	0.19 (-0.18, 0.55)	-0.13 (-0.49, 0.23)	0.24 (-1.05, 1.54)	0.17 (-0.24, 0.57)	-0.19 (-0.60, 0.22)
Education (ref: ≤ 12 years)							
> 12 years	-0.04 (-0.32, 0.24)	0.15 (-0.17, 0.47)	0.23 (-0.03, 0.50)	0.09 (-0.15, 0.33)	-0.15 (-0.71, 0.42)	-0.09 (-0.41, 0.23)	0.02 (-0.30, 0.33)
Race (ref: European[§]/White/Thai*)							
Aboriginal/Black	-0.13 (-0.45, 0.19)	--	--	0.09 (-0.37, 0.56)	--	--	--
Other	-0.13 (-0.45, 0.19)	-0.29 (-0.59, 0.01)	-0.06 (-0.35, 0.22)	***0.56 (0.11, 1.02)***	0.95 (-0.04, 1.94)	0.18 (-0.35, 0.71)	0.08 (-0.30, 0.47)
Age of Sexual Debut (ref: ≤ 15 years)							
16-19 years	-0.03 (-0.32, 0.27)	-0.29 (-0.61, 0.03)	0.04 (-0.21, 0.30)	***-0.26 (-0.51, -0.02)***	***0.60 (0.09, 1.12)***	0.19 (-0.08, 0.46)	0.03 (-0.27, 0.33)
> 20 years	-0.25(-0.68, 0.18)	-0.29 (-0.85, 0.28)	-0.04 (-0.38, 0.31)	-0.04 (-0.35, 0.27)	-0.05 (-0.59, 0.50)	0.14 (-0.35, 0.63)	0.04 (-0.38, 0.47)
Drug Use in Last Year (ref: No drug use)							
Yes	-0.04 (-0.33, 0.25)	0.01 (-0.30, 0.32)	***0.29 (0.06, 0.51)***	0.04 (-0.18, 0.27)	-0.00 (-0.47, 0.46)	0.18 (-0.08, 0.44)	0.04 (-0.24, 0.33)
Relationship Status (ref: Single)							
In a relationship	***-0.39 (-0.67, -0.10)***	-0.30 (-0.60, 0.01)	-0.16 (-0.41, 0.09)	-0.10 (-0.34, 0.14)	0.11 (-0.30, 0.52)	-0.08 (-0.33, 0.18)	-0.23 (-0.52, 0.06)
Percent of Protected versus all Anal Sex Partners in Previous Year (ref: Never anal or 100% safe)							
99-50% safe	0.22 (-0.18, 0.63)	0.09 (-0.30, 0.47)	***-0.39 (-0.75, -0.03)***	0.09 (-0.28, 0.45)	***1.18 (0.58, 1.77)***	0.16 (-0.19, 0.51)	0.36 (-0.12, 0.84)
1-49% safe	0.13 (-0.45, 0.71)	0.53 (-0.10, 1.15)	-0.55 (-1.19, 0.10)	***0.70 (0.18, 1.21)***	0.89 (-0.24, 2.02)	***1.10 (0.54, 1.65)***	0.68 (0.11, 1.25)
Never safe	0.03 (-0.38, 0.43)	0.02 (-0.41, 0.45)	-0.29 (-0.63, 0.06)	-0.10 (-0.43, 0.23)	0.55 (-0.02, 1.13)	0.15 (-0.19, 0.49)	0.29 (-0.14, 0.72)
Percent of Lifetime Anal Sex Partners in Last Year (ref: Never anal or 100% of partners)							
99-50% of partners	0.09 (-0.61, 0.78)	0.48 (-0.14, 1.10)	-0.21 (-0.72, 0.31)	0.03 (-0.59, 0.65)	-0.75 (-1.60, 0.09)	0.04 (-0.51, 0.60)	-0.18 (-0.73, 0.37)
1-49% of partners	0.00 (-0.61, 0.61)	0.25 (-0.27, 0.78)	-0.28 (-0.73, 0.17)	0.06 (-0.50, 0.62)	0.28 (-0.30, 0.85)	0.01 (-0.47, 0.49)	0.49 (0.06, 0.93)
0% of partners	-0.05 (-0.88, 0.78)	0.60 (-1.88, 0.68)	***-1.03 (-1.64, -0.41)***	-0.17 (-0.90, 0.55)	0.28 (-0.68, 1.24)	0.12 (-0.61, 0.84)	0.74 (0.08, 1.40)
Time Since Most Recent HIV Test (ref: ≤ 6 months)							
7-12 months	-0.26 (-0.63, 0.12)	-0.25 (-0.64, 0.14)	-0.23 (-0.52, 0.07)	***0.29 (0.00, 0.59)***	-0.50 (-1.83, 0.82)	0.24 (-0.09, 0.56)	0.03 (-0.34, 0.39)

1-2 years	-0.27 (-0.65, 0.10)	0.08 (-0.31, 0.48)	***-0.46 (-0.78, -0.13)***	0.13 (-0.18, 0.44)	-0.67 (-1.99, 0.64)	0.15 (-0.18, 0.47)	-0.34 (-0.71, 0.04)
> 2 years	-0.03 (-0.41, 0.34)	0.22 (-0.20, 0.65)	-0.14 (-0.45, 0.17)	0.08 (-0.22, 0.38)	-0.36 (-1.69, 0.97)	-0.52 (-1.04, 0.00)	-0.36 (-0.75, 0.03)
External Homophobic Discrimination (mean, sd)	0.03(0.03)	0.00 (0.03)	0.01 (0.02)	0.03 (0.02)	0.05 (0.05)	0.03 (0.03)	0.03 (0.03)
Internalized Homophobia (mean, sd)	0.00 (0.01)	0.01 (-0.01)	0.00 (0.01)	***0.01 (0.01)***	0.00 (0.01)	***0.01 (0.01)***	0.01 (0.01)
Experiences of Heteronormative Social Pressure (mean, sd)	-0.03 (0.02)	-0.01 (0.02)	0.00 (0.02)	0.00 (0.02)	-0.01 (0.02)	0.03 (0.02)	-0.01 (0.02)

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Chapter V: Public Health Recommendations

The results of this study demonstrate that a complex array of factors influences MSM's experiences of homophobia, risk-taking behaviors, and perceptions of HIV risk. However, it is clear that in order to effectively reverse the HIV/AIDS epidemic among MSM worldwide, we must implement new, novel approaches to HIV prevention. Such approaches must look beyond individual-level risk behaviors to the context in which these risk behaviors occur, as well as the external factors which put MSM at risk for these behaviors. Moreover, in order to successfully combat the spread of HIV/AIDS among MSM, it is evident that a multi-faceted approach aimed at removing distal determinants of sexual minority discrimination is necessary (**Figure 2)**.

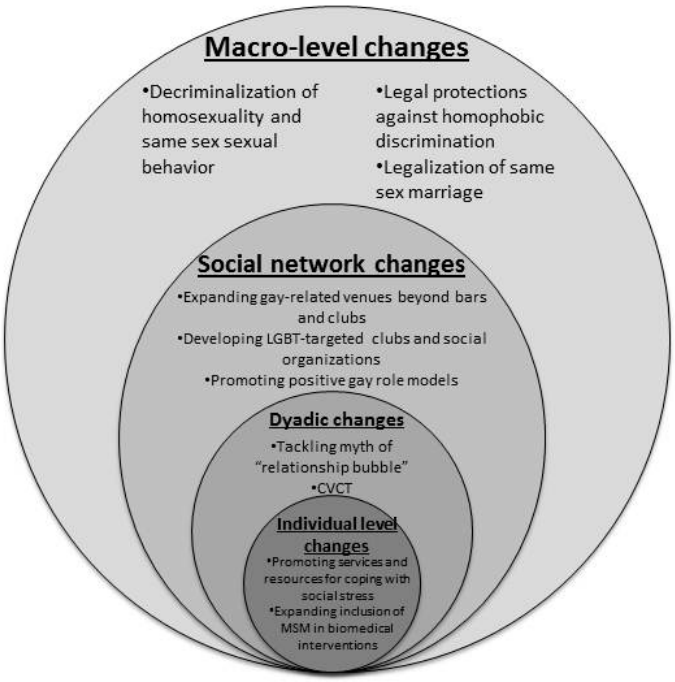

Figure 2: Multi-faceted approach to removing distal determinants of sexual minority discrimination

1. ***Macro-level changes that reduce institutionalized discrimination and environmental risk-factors which contribute to the marginalization of MSM's physical and mental health***

The institutionalization of homophobia through the criminalization of same-sex sexual behavior and the failure to extend legal protections to LGBT creates structural barriers to accessing basic HIV prevention services and increases risk for HIV infection. Not only does criminalizing and stigmatizing same-sex sexual behaviors drive these behaviors underground, but it also prevents MSM from accessing resources which encourage safe sexual behaviors. In settings where homosexuality is criminalized or heavily stigmatized, risk-reduction items such as water-based lubricant are extremely expensive, and purchasing them is highly stigmatized (Baral et al., 2009). Additionally, in these settings MSM are less likely to seek sexual/reproductive health services, to disclose their risks to healthcare providers and sexual partners, and they are more vulnerable to blackmail (Baral et al., 2009; Beyrer, 2010). Even providing health services to MSM can be dangerous in settings where homosexuality is criminalized: in Nepal and India, police officers have physically abused MSM outreach workers; and health care staff in Senegal's first MSM-friendly clinic were sentenced to 9 years in prison (Baral et al., 2009). Thus, first and foremost, efforts should be made to not only remove all sanctions criminalizing same-sex sexual behavior, but also to hold governments accountable if they continue to discriminate against sexual minorities. In December 2008, the United Nations General Assembly called for an end to discrimination against sexual minorities and announced their support for the equal rights, including the right to health, for all persons regardless of sexual orientation. While this was a monumental recognition of equal rights for sexual minorities, the agreement was non-binding and carries no weight in enforcing the legal recognition of sexual minorities' human rights. Failure to extend protections and equal rights to sexual minorities should be considered an egregious human rights offense, and governments that continue to criminalize same-sex behavior should be held accountable for these offenses by the same sanctions and embargos that international organizations and governments impose on countries which refuse to recognize other basic human rights.

Being forced to conceal one's identity has profound mental health effects which may put one at risk for a preponderance of psychological disorders and ultimately HIV infection. Criminalizing same-sex sexual behavior encourages MSM (and the larger LGBT population) to hide their identities, which, intrinsically, has deleterious health effects (Cole, Kemeny, Taylor, & Visscher, 1996). Hatzenbuhler et al (2009) found that LGBT individuals living in states without legal protections for LGBTs against employment discrimination and hate crime victimization had significantly higher prevalences of psychiatric disorders, and were significantly more likely to be comorbid for 2 or more psychiatric disorders. Furthermore, concealing one's sexual identity impedes MSM from developing romantic relationships and social support networks, both of which the current research, among other studies (Frost & Meyer, 2009, 2012; Gaines et al., 2005; Kertzner, Meyer, Frost, & Stirratt, 2009; Meyer, 2003; Otis, Rostosky, Riggle, & Hamrin, 2006; Ross & Rosser, 1996) have shown to have protective mental health effects.

One macro-level policy change that could reduce institutionalized homophobic discrimination and significantly improve the physical and mental health of MSM is the legalization of same-sex marriage. In 2009, the American Medical Association officially recognized that excluding sexual minorities from same-sex marriage contributes to health disparities within same-sex households (American Medical Association, 2009). Recent research by Wight et al (2013) found that, among individuals in same-sex couples in California, rates of psychological distress were significantly lower among individuals in legally recognized same-sex unions compared to individuals whose same-sex unions were not legally recognized. However, the health benefits of the legalization of same-sex marriage extend beyond individuals in union. Since the legalization of same-sex marriage in Massachusetts in 2004, there has been a significant reduction in physical and mental health care visits as well as a significant reduction in health care expenditures among both partnered and unpartnered MSM (Hatzenbuehler et al., 2012). While research on the health benefits of same-sex marriage is limited to the United States and the

Netherlands, the benefits of social justice and equality are universal, and point to the need for worldwide recognition of equal marriage rights for everyone, everywhere.

2. Utilizing social networks as a support system of positive role models and to increase access to social networks beyond gay bars and clubs

The benefits of social networks are numerous. Social networks provide a support system of other MSM experiencing similar stigmatizations and prejudices; they link MSM to positive role models, and allow MSM to make positive comparisons to similar men facing similar experiences; and they encourage outness and participation in gay-related events and culture, and help MSM to build positive sexual identities. However, social networks may confer negative influences as well. Research by Peterson et al (2009) and Smith et al (2004) found that gay men whose social networks contain individuals with perceived or actual greater sexual risk-taking are themselves more likely to partake in high-risk behaviors. While the current study failed to substantiate other research proffering that having a larger social network of MSM was associated with increased alcohol and drug consumption due to gay bars being the traditional scene for MSM socialization, it does call to question the ubiquity of gay-related venues where alcohol and drugs are abundant (i.e. bars, clubs, circuit parties). Future efforts should be focused on encouraging the development of social networks within gay-related venues that encourage safe and healthy behaviors and do not normalize the use of alcohol or drugs.

The development of LGBT-friendly or LGBT-targeted sports leagues, volunteer organizations, and social clubs are among many possible approaches that may be taken to help develop positive social networks for MSM. Not only would engaging in such social networks encourage socialization outside of the traditional gay bar scene, but also encourage physical activity, teamwork and camaraderie, healthy competition, and civic participation. Perhaps instead of phone apps such as Grindr and Closur, which are designed to help men meet other men for the purpose of casual sex, LGBT organizations should invest in developing apps designed to help likeminded MSM organize sports teams, book clubs, restaurant reviews, community service

organizations, and other special interest groups. Additionally, LGBT organizations should develop campaigns promoting positive role models within the MSM and LGBT communities. This can be achieved through partnerships with business owners, politicians, community leaders, and celebrities living as proud MSM, who are interested in sharing their stories and promoting safe behaviors.

3. Providing dyadic interventions aimed at HIV prevention and treatment

The results from this study suggested that relationships are protective against a variety of risk-taking behaviors, such as drug use and intoxicated intercourse, as well as against feelings of internalized homophobia. However, the results also demonstrated that MSM perceive their relationships as protective against HIV, a common misconception. Given that recent research suggests that the majority of incident HIV infections among MSM result from intercourse with a main partner (Davidovich et al., 2001; Goodreau et al., 2012; Sullivan, Salazar, Buchbinder, & Sanchez, 2009), tackling the myth of the "relationship bubble"- the belief that relationships are protective against HIV sero-conversion—is of paramount importance if the HIV epidemic among MSM is to be reversed. As such, couples-based approaches to HIV prevention, such as couples HIV voluntary counseling and testing (CVCT), have the potential to make a huge contribution to the reversal of the HIV epidemic among MSM. The effectiveness of CVCT as a tool for decreasing sexual risk taking, increasing consistent condom use, and reducing HIV transmission has been demonstrated among sero-discordant heterosexual couples in Sub-Saharan Africa (Allen et al., 2003; Dunkle et al., 2008; Painter, 2001; Roth et al., 2001). Recent research suggests that MSM worldwide, particularly those in main partnerships, are also accepting of CVCT and willing to use it as an HIV prevention tool (Stephenson, Rentsch, & Sullivan, 2012; Stephenson et al., 2011; Wagenaar et al., 2012). If CVCT were to be widely implemented, it could help to identify sero-discordant couples, negotiate an action plan for the prevention of sero-conversion, and encourage adherence to HIV treatment services.

4. Improving individual-level risk prevention services

This study argues that macro-level changes, such as legal protections against homophobic discrimination, are necessary to improve the socio-contextual environment in which MSM live and to remove structural barriers to accessing care. However, such changes will provide little protection if they are not coupled with resources that MSM and LGBT may seek to help cope with the social stressors, stigmatization, and discrimination they face as sexual minorities. Attention should be focused on designing and providing mental health services specifically tailored to MSM and LGBT populations. Organizations such as the National Gay and Lesbian Task Force; Parents, Family, and Friends of Lesbians and Gays (P-FLAG); and the Gay and Lesbian Alliance Against Defamation (GLAAD) should help improve access to mental health services via the dissemination of informational and educational materials, identification of networks of LGBT healthcare providers, and subsidization of medical costs for those who cannot afford to seek care. Additionally, given the preponderance of risk behaviors associated with experiencing homophobia, both external homophobic discrimination and internalized homophobia should be included in routine HIV/STI counseling and testing tools for MSM.

Finally, investigations into the applicability of individual-level biomedical prevention interventions for MSM, such as male circumcision, the use of pre-exposure prophylaxis (PrEP), and anal microbicides should be scaled-up. Male circumcision has been effective in reducing HIV transmission among heterosexual men, yet there has been no research to date investigating the evidence base of male circumcision as an HIV prevention tool for MSM (Beyrer, 2010). Efficacy trials for both anal microbicides and PrEP are at nascent stages, but researchers are optimistic that these interventions may ultimately be worthwhile modalities for HIV prevention among MSM (Beyrer, 2010).

Three decades into the AIDS pandemic, MSM continue to bear the greatest burden of the disease. While HIV incidence has remained stable or declined among other risk groups (Hall et al., 2008), MSM worldwide are facing re-emerging epidemics (Beyrer et al., 2011; Centers for

Disease Control and Prevention, 2010; Sullivan, Hamouda, et al., 2009). It is clear that HIV prevention efforts for MSM cannot continue business as usual. Taking a multi-faceted approach, and concurrently incorporating structural, cultural/environmental, group-level, and individual-level interventions to eliminate homophobia and social stressors, to improve social support systems, and to increase access to physical and mental health services for MSM is urgently needed to effectively and efficiently reverse the HIV/AIDS pandemic among MSM worldwide.

Chapter VI: References

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