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Psychosocial Vulnerability and HIV-related Sexual Risk among Men who have Sex with Men and Women in the United States

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Abstract

In the U.S., HIV is concentrated among men who have sex with men (MSM), some of whom have had female partners (MSMW). MSMW are disproportionately impacted by psychosocial vulnerabilities, like depression and substance use that increase sexually transmitted infection (STI) and HIV risk. Research on psychosocial vulnerability and HIV-related sexual risk among MSMW is warranted to reduce infection transmission among MSM and to prevent bridging to female partners. We analyzed data from Wave IV (2007–2008) of the National Longitudinal Study of Adolescent Health to assess psychosocial vulnerability and HIV risk-taking among MSMW. Using lifetime and past year sexual activity, we classified men as ever having sex with: women only (MSW), men only (MSMO) or MSMW, with further refined categorization of MSMW with male only partners in the past 12 months, only female partners in the past 12 months, and both male and female partners in the past 12 months (N = 6,945). We compared psychosocial vulnerability characteristics and HIV-related risk behaviors among the five categories of men. MSMW were more likely to report depression, suicidality, substance use, and incarceration than MSW and MSMO. Compared to MSW, MSMW with current female partners had greater odds of unprotected sex, exchange sex, and STI. MSMW with male partners in the past year had greater odds of multiple or concurrent partners in the past year. HIV risk and psychosocial vulnerability factors are elevated among MSMW, a priority population for HIV risk reduction. HIV risk reduction interventions should address this and heterogeneity of sexual partnerships among MSMW.

Keywords

HIV; sexually transmitted infections; substance use; sexual minorities; epidemiology; sexual orientation

INTRODUCTION

HIV persists as an important public health concern in the U.S. HIV levels in certain sub-populations, such as in men who have sex with men (MSM), are comparable to those observed in sub-Saharan Africa (El-Sadr, Mayer, & Hodder, 2010). Preliminary incidence data from the HIV Prevention Trials Network 061 study (HPTN061), a large, multisite trial of Black men who have sex with men (MSM) in 6 urban areas in the U.S., highlighted the disproportionate risk of HIV in this population (Mayer, 2012): 3% became newly infected over 12 months. Similar findings have been documented in other MSM populations, including in White and minority subgroups (Bruce, Harper, & Suleta, 2012; D'anna, et al., 2012; Operario, Smith, Arnold, & Kegeles, 2011; Sullivan, Salazar, Buchbinder, & Sanchez, 2009).

Among participants of HPTN061, approximately half were men who had sex with men only (MSMO) in the six months prior to recruitment (53%), while 47% were men who had sex with both men and women (MSMW) in the past six months. While HIV incidence was highest among MSMO (3.8%), incidence among MSMW also was very high (2.7%) (Mayer, 2012). These data highlighted the potential for MSMW to transmit HIV to other MSM, further concentrating infection in this group, and to play a role in the HIV/AIDS epidemic among women by serving as bridges of infection to female members of their sexual networks.

High HIV incidence observed among MSMW in HPTN061 corroborated studies that have documented high levels of HIV risk behaviors among MSMW (Dyer et al., 2013; Friedman, 2013a, 2013b; Friedman et al., 2013; Maulsby, Sifakis, German, Flynn, & Holtgrave, 2013; Tieu et al., 2012). Some studies have suggested that MSMW report higher numbers of partners, more involvement in exchange sex, and partners who were substance users than men who have sex with women (MSW) yet lower levels of these outcomes compared with MSMO (Gorbach, Murphy, Weiss, Hucks-Ortiz, & Shoptaw, 2009). Studies exploring risk patterns and partnerships among MSMW also suggest that MSMW have higher numbers of female compared to male partners (Operario et al., 2011; Zule, Bobashev, Wechsberg, Costenbader, & Coomes, 2009) and that they engage in more risky sexual practices with female rather than male partners (Harawa, McCuller, Chavers, & Janson, 2012; Operario et al., 2011), highlighting the potential epidemiologic importance of MSMW as a bridge population to women (Harawa, McCuller, Chavers, & Janson, 2012; Tieu et al., 2012).

There is evidence to suggest that MSMW exhibit elevated levels of sexual risk compared to both MSMO and MSW because they are psychologically and socially vulnerable (Dyer et al., 2013; Eaton et al., 2013; Friedman et al., 2013; Harawa et al., 2012). Psychosocial vulnerability factors are considered stressors that result in increased risk for adverse health outcomes, including HIV (Dyer et al., 2012; Halkitis & Figueroa, 2013; Halkitis et al., 2013; Pitpitan et al., 2013). Psychosocial vulnerability among MSMW is likely a result of stigma and discrimination this group experiences because they traverse two worlds that often do not converge—one of homosexual behavior and one of heterosexual identity (Allen, Myers, & Williams, 2012; Brooks, Rotheram-Borus, Bing, Ayala, & Henry, 2003; Dyer et al., 2013; Saleh, Operario, Smith, Arnold, & Kegeles, 2011). Specifically, stigma leads to

psychosocial vulnerabilities, including distress, psychopathology (e.g., depression and suicidality), and, in turn, substance use. For MSMW who may not identify with being homosexual or bisexual, the distress may be magnified. These factors are thought to ultimately increase the chances of MSMW engaging in sexual risks that place them and their male and female partners at greater risk for HIV (Brewer et al., 2013; Dyer et al., 2013; Friedman, 2013a, 2013b; Friedman et al., 2013; Harawa et al., 2012; Maulsby et al., 2012; Maulsby et al., 2013; Tieu et al., 2012).

In addition, there is a higher prevalence of prior experience with sexual abuse that may exacerbate distress and psychopathology among these men. This type of sexual trauma is strongly linked to HIV risk (Benoit & Downing, 2013; Eaton et al., 2013; Williams, Kisler, Glover, & Sciolla, 2011; Williams et al., 2013) and elevated levels of prior experience with sexual abuse have been observed among MSMW (Eaton et al., 2013; Kim et al., 2012; Williams et al., 2011; Williams et al., 2013). Finally, there is evidence that sexual trauma contributes to mental illness (Ford, Elhai, Connor, & Frueh, 2010; Johnson, Cottler, Abdallah, & O'Leary, 2011; Sartor et al., 2012), substance use (Briere, Kaltman & Green, 2008; Huang et al., 2011; Skeer, McCormick, Normand, Buka, & Gilman, 2009) and HIV-related sexual risk (Catania et al., 2008; Haydon, Hussey & Halpern, 2011; Huang et al., 2011; Medrano & Hatch, 2005; Senn & Carey, 2010; Wilson & Widom, 2009) that cluster in criminal justice involved populations, as well as contribute to criminal justice involvement (Messina & Grella, 2006; Senn, Carey & Venable, 2008).

History of criminal justice involvement has been linked to HIV risk behavior (Bland et al., 2012; Brewer et al., 2013; Epperson, Khan, El-Bassel, Wu, & Gilbert, 2011; Khan et al., 2009; Khan et al., 2011a, 2011b), which is disproportionately high in some groups of MSMW. Among MSM in HPTN 061, MSM who also had female partners had 61% higher odds of having ever been incarcerated at baseline compared to MSM who only had male partners (Brewer et al., 2013). In sum, distress, psychopathology, substance use, trauma, and criminal justice involvement may be disproportionately high in MSMW groups and may influence their psychosocial health and, in turn, HIV risk. Studies have documented high levels of psychosocial vulnerability, which may include illicit drug use, psychological distress, low levels of social support, (Dyer et al., 2013; Wheeler, Lauby, Liu, Van Sluytman, & Murrill, 2008), and more experience with incarceration among MSMW compared with both MSW and MSMO (Brewer et al., 2013; Gorbach, Murphy, Weiss, Hucks-Ortiz & Shoptaw, 2009; Operario, Smith, Arnold & Kegeles, 2011).

Although emerging evidence suggests MSMW exhibit elevated levels of HIV risk behaviors compared to MSMO (Dyer et al., 2013; Friedman, 2013a; Friedman et al., 2013; Harawa, et al., 2012; Maulsby et al., 2012; Maulsby et al., 2013; Wheeler et al., 2008), the majority of current research on HIV sexual risk behavior patterns is focused on MSMO and research conducted with MSMW populations is limited in comparison.

While there is certainly research acknowledging that MSM are not a monolithic group of men and that some MSM can be classified as MSMW, many studies continue to characterize MSMW as homogeneous. However, MSMW may represent distinct groups of men with different psychological, social, and sexual risk profiles. Some MSMW may have current

male partners, some may have current male and female partners concurrently, and others may have current female partners but have a history of sex with men, yet there is little to no research that compares groups of MSMW. Research is particularly limited among MSMW who currently have female partners yet who have a history of sex with men. MSM studies that recruit based on self-reported current or recent sex with men, may exclude men who report current sexual relationships with females, but do not self-report a lifetime history of sex with men. Therefore, these studies fail to capture the contextual history associated with men who may be classified as MSM, but in fact may fit under the classification of MSMW (Wilton et al., 2009; Wohl et al., 2012).

Prior studies documenting the high prevalence of MSMW and high HIV risk among MSMW have primarily been conducted in high-risk or minority only study populations. Consistent findings of elevated HIV risk among MSMW point to the need for a large, nationally representative study of MSMW and HIV risk. Further, given potential subgroup differences within MSMW, there is a need for a study utilizing a large data source that enables comparison of multiple categories of MSMW with MSMO and MSW on HIV risk behavior and the psychosocial vulnerability factors that are correlates of HIV risk.

The current study aimed to describe HIV risk among men who have a history of sex with women only (MSW), men who have a history of sex with men only (MSMO), and men who have a history of sex with both men and women (MSMW), including MSMW with only male partners in the past 12 months, with female partners in the past 12 months, and with both male and female partners in the past 12 months. This study used the National Longitudinal Study of Adolescent Health (Add Health) (Udry, 2003) to describe psychosocial vulnerability and HIV risk of MSW, MSMO, and MSMW in the general U.S. population. We compared these groups on lifetime and past 12 month self-reported STIs and risk behaviors, including multiple partnerships (3 or more), partner concurrency, unprotected sex, and exchange sex. We also examined differences by group in prevalence of exposure to psychosocial vulnerability factors. We hypothesized that MSMW would exhibit greater levels of the psychosocial vulnerability factors than both MSW and MSMO and exhibit elevated levels of HIV risk compared with MSW that is comparable to levels observed among MSMO. We further hypothesized that levels of psychosocial vulnerability would vary among the different subgroups of MSMW.

METHOD

Participants

The data for this study came from Wave IV of Add Health, a nationally representative, prospective cohort study that began in 1994 and was designed to investigate factors of health from adolescence into adulthood (Udry, 2003). The initial sample included over 20,000 adolescents sampled from 80 high schools and 52 middle schools throughout the U.S. (N = 20,745). Participants' ages at baseline ranged from 11 to 21 years and averaged 16 years. Wave IV, which was collected from 2007–2008 had a response rate of 80% (N = 15,701). Wave IV participants' ages ranged from 24–32 and averaged 29 years. During Wave IV, participants completed interviews assessing numerous domains of social, psychological, and behavioral measures (Harris et al., 2009).

Data from participants whose self-reported sex was male at Wave IV were included in the current study. Participants were also asked the following: “Have you ever had vaginal intercourse?” “Have you ever had oral sex?” “Have you ever had anal intercourse?” These measures were used to derive the proportion of men who reported lifetime sexual activity.

Subsequently, participants were asked, “Considering all types of sexual activity, with how many male partners have you ever had sex?” “Considering all types of sexual activity, with how many female partners have you ever had sex?” “Considering all types of sexual activity, with how many male partners have you had sex in the past 12 months, even if only one time?” and “Considering all types of sexual activity, with how many female partners have you had sex in the past 12 months, even if only one time?” Based on these self-reported sexual behaviors, we derived a six-category variable that reflected the participant’s history of lifetime or recent sex with women, men, or both.

Specifically, men who reported a lifetime history of sex with women only were considered to be MSW, those who reported a lifetime history of sex with men only were considered to be MSMO, and those who reported having a lifetime history of sex with men and women were coded as being in one of four categories of MSMW, including MSMW with current male partners, current female partners, and current male and female partners, concurrently. The fourth category was MSMW with no current partners.

There were 7,349 men eligible based on self-identified sex at Wave IV and 87% of those reported a history of sexual intercourse, yielding an analytic sample of 6,945.

Ethical approval for this research was obtained from the University of Maryland Population Research Center Institutional Review Board.

Measures

Outcomes: Lifetime Sexual Identity and HIV-related Sexual Risk Behaviors—

Sexual identity variables included heterosexual, homosexual, bisexual, and other identity. Sexual orientation was derived from measures asking participants if they were romantically attracted to males and a measure asking participant if they were romantically attracted to females.

Number of Sexual Partners—Number of lifetime male sexual partners was a variable derived from a measure asking participants “Considering all types of sexual activity, with how many male partners have you ever had sex?” Similarly, number of lifetime female sexual partners was a variable derived from a measure asking participants, “Considering all types of sexual activity, with how many female partners have you ever had sex?” We then created a variable that combined the two to derive the variable for lifetime number of sexual partners.

Number of male sexual partners in the past 12 months was a variable derived from a measure asking participants “Considering all types of sexual activity, with how many male partners have you had sex in the past 12 months?” Similarly, number of female sexual partners in the past 12 months was a variable derived from a measure asking participants,

“Considering all types of sexual activity, with how many female partners have you had sex in the past 12 months?” We then created a variable that combined the two to derive the continuous measure for number of sex partners in the past 12 months.

Early sex was defined as having had oral, vaginal or anal sex prior to age 16 years and was derived from three questions asking participants the age at which they first engaged in vaginal, oral and/or anal intercourse (Cavazos-Rehg et al., 2009).

HIV-related Sexual Risk Factors in the Past 12 Months—Recent HIV-related risk variables included self-reported history of STIs, having a high number of sex partners, partner concurrency, condom use, and involvement in exchange sex, all within the past 12 months.

Self-reported history of STIs was an indicator of whether participants had in the past 12 months “been told by a doctor that they had any one of the following:” (1) gonorrhea, (2) Chlamydia, (3) syphilis, (4) herpes simplex virus (HSV), or (5) genital warts. A response of 1 = Yes for any one and the participant was coded 1 = Yes for “Any STD in the past 12 months.”

High number of sex partners was a variable that was derived from a question asking participants the number of male and/or female partners they had in the past 12 months. Then, based on the distribution for the total sample of men in the study, this variable was dichotomized at the median value.

Partner concurrency was measured by a question asking the participant “In the past 12 months, did you have sex with more than one partner at around the same time? The variable was coded 1 = Yes and 0 = No.

Condom use in the past 12 months was measured by a question asking participants if “In the past 12 months, did you or your partner(s) use condoms for birth control or disease prevention?” The variable was original coded 1 = Yes and 0 = No and reverse coded for these analyses, such that a 1 = “no condom use” and a 0 = “condom use.”

Involvement in exchange sex within the past 12 months was measured by a question asking participants “In the past 12 months, how many times have you paid someone to have sex with you or has someone paid you to have sex with them?” This variable was then dichotomized 1 = Yes and 0 = No.

Psychosocial Vulnerability Factors

Substance Use Variables: Substance use variables included lifetime marijuana, cocaine, and methamphetamine use. Stimulant drug use was coded “1 = Yes” if the participant used either cocaine or methamphetamine and “0 = No” if they had used neither. Alcohol use variables included daily alcohol use within the past 12 months, as well as alcohol use in the past 30 days.

Depression and Suicidality: Participants were asked whether “During the past 12 months have you ever seriously considered suicide?” Additionally, participants were asked if they if

they had ever been diagnosed with depression. These variables were coded 1 = Yes and 0 = No.

History of Incarceration: History of incarceration was measured by a variable asking of participants if they had ever been incarcerated. The variable was dichotomously coded 1 = Yes and 0 = No.

Forced Sex: Forced sex was a variable measured by a question asking participants “Have you ever been physically forced to have any type of sexual activity against your will?” This variable was coded 1 = Yes and 0 = No.

Statistical Analyses

For all analyses, we used survey commands in STATA SE 12.0 software (StataCorp, 2011) to account for stratification, clustering, and unequal selection probabilities, yielding nationally representative estimates. Weighted frequency distributions of demographics, substance use, psychosocial factors, sexual risk, and STIs were tabulated for MSW, MSMO, MSMW with no current partners, MSMW with a current male partner, MSMW with a current female partner, and MSMW with both current male and female partners. Chi-square tests were used to compare differences in characteristics between the 6 groups of men. Bivariable and multivariable logistic regression models were then used to assess weighted associations between the five groups of men reporting sex during the past year. Regression models were also used to assess the increased risk of the outcomes of interest in the past 12 months, which were self-reported STIs, having 3 or more sex partners, partner concurrency, condom use, and involvement in exchange sex. The referent group for the multivariate analyses was MSW excepting the model testing associations of condom use, for which MSM was the referent group (D’anna et al., 2012). These regression analyses excluded MSMW with no male or female partners in the past 12 months, given the models assessed HIV-related sexual risk behaviors in the past 12 months.

RESULTS

Demographic Characteristics

Table 1 shows the demographic characteristics for the study sample. The majority of the population (N = 6,613) was MSW (95%), 110 were MSMO (1.6%), and 376 were MSMW (3.4%). In the past 12 months, 18% of MSMW had neither a male nor female partner (N = 66), 41% had a female but no male partner (N = 155), 26% had a male but no female partner (N = 97), and 15% had both a male and a female partner (N = 58). Mean age of the sample was 29 years of age. There were no significant age differences between the six groups of men. MSMW were however, less likely to be white or Asian and were also less educated and in lower income brackets.

MSMW reported more psychosocial vulnerability and were more likely to report use of stimulant drugs, with MSMW with current male and female partners reporting more methamphetamine (44%) and cocaine use (24%) than other MSMW groups. MSMW reported more daily drinking. Finally, differences in depression and suicidality were noted.

MSMW with current male partners were more likely to report having been diagnosed with depression (24.6%) while MSMW with current male and female partners were more likely to report suicidality (21.1%). MSMW also reported more incarceration with MSMW with current male and female partners being more likely to report a history of incarceration (43%) compared to other groups of MSMW. MSMO and MSMW were much more likely to report a lifetime history of forced sex (11–17%) than MSW (3%) with MSMW with current female partners reporting the highest level of this outcome (17%).

In general, sexual identity mapped onto sexual behavior categories. The vast majority of MSW (97%) self-identified as heterosexual, 75% of MSMO self-identified as homosexual, and MSMW were more likely than MSW and MSMO to identify as bisexual, with 72% of MSMW with current male and female partners reporting bisexual identity. However, over one-quarter of MSMW with current female partners reported heterosexual identity. Likewise, with respect to sexual orientation, MSW tended to report attraction to women only, MSMO tended to be attracted to men only, whereas MSMW had the highest percentages reporting attraction to both genders (Table 2). Roughly 57% of MSMW with current male and female partners reported not being romantically attracted to males despite current sex with both men and women.

MSMW with current male partners were more likely to report a lifetime history of STIs (37%) compared to other groups (MSMO: 26%; MSW: 13%). MSMW with current male and female partners had much higher mean and median lifetime number of partners (M: 34, median: 10), compared to all other groups of men (MSMO: M: 5; median: 25; MSW: M: 4, median: 20). MSMW in the sample were also more likely to report early sexual debut.

Table 3 shows the results of the weighted unadjusted and adjusted odds of engaging in risky sexual behavior in the past 12 months, including self-reported STI, having 3 or more sex partners, partner concurrency, condom use, and engagement in exchange sex.

In models adjusting for age, race/ethnicity, education, and household income, compared to MSW, all other groups had higher odds of reporting an STI diagnosis; however, only statistically significant differences were found among MSMO and MSMW with current female partners. MSMO had almost 4 times the odds of having had an STI diagnoses compared to MSW (aOR = 3.90, 95% CI = 1.75–8.68), while MSMW with current female partners had almost 3 times to odds of having been diagnosed with an STI compared to MSW (aOR = 2.94, 95% CI = 1.19–7.29).

MSMO had 5 times the odds of having had 3 or more partners in the past 12 months compared to MSW (aOR = 5.06, 95% CI = 2.87–8.91), whereas MSMW with current male and female partners had more than 3.5 times the odds (aOR = 3.81, 95% CI = 1.70–8.52), and MSMW with current male partners had almost 3 times the odds of having 3 or more partners in the past 12 months (aOR = 2.82, 95% CI = 1.44–5.48).

MSMO (aOR = 3.01, 95% CI = 1.59–5.69) and MSMW with current male partners (aOR = 3.14, 95% CI = 1.65–5.99) had at least 3 times the odds of reporting that they had concurrent partnerships in the past year, compared to MSW, whereas MSMW with current male and

female partners had 2.5 times the odds of reporting concurrent partnerships compared to MSW (aOR = 2.59, 95% CI = 1.10–6.06).

Compared to MSMO, MSMW with current female partners had more than 2.5 times the odds of having unprotected sex (no condom use) during the past 12 months (aOR = 2.68, 95% CI = 1.04–6.91), while MSW had more than 3 times the odds (aOR = 3.16, 95% CI = 1.34–7.46). Additionally, MSMW with current female partners had more than 3 times the odds of engaging in exchange sex (aOR = 3.31, 95% CI = 1.39–7.87) than MSW.

DISCUSSION

This study characterized psychosocial vulnerability and HIV-related sexual risk differences among six groups of men defined by the gender of their current and prior sexual partners, using a population-based sample of men in the U.S. To date, this is one of the first studies to examine HIV risk among adult MSW, MSMO, and MSMW at the population level (Mays & Cochran, 2001). Our study was unique in that it further explored HIV risk within different subgroups of MSMW, differentiating between MSMWs with current male and female partners, MSMWs with current male partners only, and MSMWs with current female partners only (but who had a history of sex with men).

Almost half of all MSMW in the sample (41%) reported recent sex with women only, which is a fairly high proportion of the sample and consistent with other studies (Dyer et al., 2013). The sample of men in this study, therefore, reflects the diversity of sexual partners of MSMW, which ultimately allows us to describe the psychosocial vulnerability and HIV-related sexual risk among the heterogeneous MSMW subgroups, based on the gender of their recent sexual partners. This diversity within MSMW subgroups, while difficult to capture in studies of MSM that sample men based solely on their reported sex behaviors with men, provides the ability to examine distinctions between subgroups of MSMW that may account for disproportionate rates of HIV among members of their sexual networks.

We found that the sexual risk outcomes that drive HIV infection clustered in MSM groups, including MSMWs, compared with MSW, supporting extant literature (Latkin et al., 2012; Maulsby et al., 2012; McKay & Mutchler, 2011; Nakamura, Semple, Strathdee & Patterson, 2011; Tieu et al., 2012). We observed elevations in HIV risk among all groups of MSMWs, including those who currently report female partners only yet who have a history of sex with men. The current findings highlight the need for HIV screening and prevention to reach all population of MSM, including those who have current and prior histories of sex with male partners.

Overall, MSMO had the highest levels of HIV risk indicators, including multiple and concurrent partnerships and self-reported STI compared with other groups. They were also more likely to have used stimulant drugs compared to MSW and were more likely to report use of alcohol within the past 30 days. These findings support studies that show MSMO exhibit higher levels of risk behaviors compared to MSW (Nyitray et al., 2011; Pathela et al., 2011; Rietmeijer, Patnaik, Judson & Douglas, 2003).

MSMW with current male and female partners comprised an intermediate risk group compared to MSW and MSMO in terms of recent STI. They had high partnership rates and similar to higher levels of concurrent partnerships as MSMO. Analyses revealed that they also had the highest levels of lifetime number of partners (22 vs. <15 for all other groups).

Given that a history of sex with men is the most prominent transmission risk for both males and females, men who have current female partners but have a history of sex with men or who also currently have sex with men, may potentially transmit HIV not only to MSM but to the other categories of MSMW. The results of our study indicated that MSMW with current female partners who may not currently be engaging in sex with men—a population of MSMW that is not generally captured in MSM samples—exhibit elevated multiple partnerships, STI, and unprotected sex, highlighting the potential of this group to transmit infection to female partners. Specifically, these men had comparable levels of multiple partnerships and self-reported STI as MSMO (nearly three times the odds compared with MSW) and higher lifetime numbers of partners (median 15 partners) than any other group including MSW (median 8 partners) and MSMOs (median 12 partners). While levels of self-reported STI and multiple partnerships were comparable to MSMOs, MSMWs with current female partners had much higher levels of unprotected sex in the past 12 months (40%) than any other MSM groups (13–23%). These men were also more likely to be involved in exchanging sex and to have been forced to have sex, further placing them at elevated HIV risk, supporting findings from other studies (Bobashev, Zule, Osilla, Kline, & Wechsberg, 2009; Dyer et al., 2013; Eaton et al., 2013; Friedman et al., 2013; Nakamura, Semple, Strathdee, & Patterson, 2011; Zule, Bobashev, Wechsberg, Costenbader, & Coomes, 2009).

Our findings also indicated that MSMWs with current female partners only were highly likely to identify as heterosexual and to report not having a romantic attraction to males, despite a history of sex with men; strong identification as heterosexual may prevent MSMWs with current female partners from disclosing their history of sex with men to female partners, potentially reducing these partners' perceived risk and hence motivation to push for condom use with the partner and/or STI/HIV testing of the partner.

This study suggests that MSMWs with current female partners only may play an important role in bridging the male and female HIV epidemics in the U.S. given their elevated HIV risk behaviors yet current behavior of sex with women. The study also highlights the need for future studies to consider this population of MSMW and their female partners.

Our study also supports research that suggests disproportionate psychosocial vulnerability among MSMW, which may help elucidate underlying factors that influence HIV risk. MSMW in general were also more depressed, indicating both social and psychological vulnerability among these men. MSMW with current male and female partners experienced more incarceration and more suicidal ideation, which supports current studies highlighting HIV risk among men who have a history of incarceration and suggests the need for structural interventions in order to decrease risk among these men (Adams, Stuewig, Tangney, & Kashdan, 2013; Bland et al., 2012; Brewer et al., 2013; Epperson et al., 2010; Epperson et al., 2011; Khan et al., 2009, 2011a, 2011b, 2012).

Our study also found a high burden of lifetime substance use and high levels of recent alcohol use among MSMW and highlights that HIV prevention interventions should attend to meaningful behavioral differences within the MSM community, paying special attention to MSMW who may be substantially more likely to engage in high risk sex with both male and female partners as a result of alcohol use. HIV prevention programs that include substance use and, notably, alcohol use risk reduction treatment, yet which also addresses how the psychosocial vulnerability of MSMW may drive substance use such as heavy drinking and HIV risk, are warranted (Halkitis et al., 2011).

This study had several limitations that should be noted. Data were collected via self-report, which is subject to the potential for social desirability bias. However, the Add Health survey collected data via ACASI, a technique that has been found to enhance the quality of self-reporting of sensitive and illegal information, thus reducing the likelihood of social desirability bias (Macalino, Celentano, Latkin, Strathdee, & Vlahov, 2002; Turner et al., 1998). Additionally, survey questions required participants to recall 12-month and lifetime information, which allows for the potential for recall bias.

The possibility of spurious associations due to misclassification bias cannot be ruled out. For this analysis, the men were categorized as either MSW or MSMW with varying partnerships in the prior 12 months. Therefore, it is possible that some men classified as MSW may actually have had female partners and men classified as MSMW may have had sex only with men outside of the 12 month period of recall. While the possibility of misclassification cannot be discounted, data outside the 12 month recall period were unavailable at Wave IV. As such, the study highlights the differences in psychosocial vulnerability factors and HIV/STI risk among men who were categorized according to their self-reported sexual behavior and partnership types during a specific time period. Longitudinal studies are warranted to document sexual behavior and partnership types over a longer period of time. Additionally, qualitative studies that disentangle sexual behavior from ecological meanings of that behavior (e.g., gay, heterosexual, etc.) are necessary to develop a deeper understanding of these men's potential risk for HIV transmission.

The data for this study also did not allow the exploration of other social vulnerability factors, such as stigma and discrimination based on either race or sexual identity. The current literature suggests the potential for sexual identity to influence HIV risk, including HIV testing behaviors (Jeffries, 2010). Extant literature suggests a greater burden of these factors among racial/ethnic minority MSM and may assist in explaining contextual differences in the ways these men identify compared to their behavior. For instance, in the current study, we found that African American and Latino MSMW were less likely to identify with being homosexual or bisexual, which may be a result of underlying social and cultural factors that may be obscured due to the categorization of these men being based solely on behavior and may be explained by examining other social vulnerabilities experienced by gay/bisexual men of color. Unfortunately, we could not explore these very important social factors that may indeed help explain some of the disproportionate vulnerability found in this study. This descriptive study also did not test associations between the psychosocial vulnerability factors (e.g., depression and substance use) and future studies should examine explanatory relationships among factors. We were unable to

address issues around disclosure of same-sex behavior among MSMW, which has been noted to be associated with sexual risk taking (Dodge, Jeffries, & Sandfort, 2008; Schrimshaw, Siegel & Downing, 2010; Shearer, Khosropour, Stephenson, & Sullivan, 2012). This study was also cross-sectional, therefore limiting our ability to explore causal pathways. Finally, our measure of condom use within the past year did not provide a precise measure of sexual risk behaviors found in other studies that capture condom use at last sex.

Despite these limitations, our study had several strengths that should be highlighted. This study contributes to the literature on sexual risk among men in the U.S. and, more specifically, men who currently have sex with women but have a history of sex with males who may potentially bridge HIV and other STIs to both their male and female partners. To our knowledge, this was the first study to differentiate among the heterogeneous subgroups of MSMW at the population level and to describe differential correlates associated with sexual risk taking among these different groups of men. Additionally, the present study was strengthened by the use of population-based data with a large sample size.

Conclusions

Overall, this study corroborated findings from prior research that suggests elevated HIV risk behaviors among MSM. Our study acknowledges that MSMW are not a homogeneous group and that, within this heterogeneity, elevated risk exists. Men who report current partnerships with women and previous histories of sex partnerships with men exhibit elevated HIV risk, which has implications for male and female members of their sexual networks. Several studies, including the current study, highlight the importance of exploring the potential risk for women whose partners have a history of sex with men (Benoit & Koken, 2012; Benoit, Pass, Randolph, Murray, & Downing, 2012; McKay & Mutchler, 2011; Schrimshaw et al., 2010; Shearer et al., 2012). Future studies should explore longitudinally sexual behavior and sexual identity of MSMW to develop a better understanding of the potential to bridge to male and female partners. It is clear that public health research and prevention efforts have not adequately addressed HIV transmission risk among MSMW and their female partners. Given that MSMW, who may not identify with being bisexual, may be less likely reveal that they have or have had female partners (or male partners) and also may fail to fully disclose same sex behavior to female partners. This also makes conducting prevention efforts within this particular segment of MSM, more challenging for researchers, which may have severe consequences for women. Because MSMW may serve as an important bridge population for HIV among women as well as men in the U.S., future studies and public health interventions should consider the full spectrum of partnership types and social networks of MSM. Intervention development should include sexual self-identity and its potential relations to sexual risk behavior in order to develop a more holistic approach to HIV/STI risk prevention among behaviorally bisexual men.

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Table 1

Demographic Characteristics and Psychosocial Vulnerability Factors among MSW, MSMO, and MSMW in the United States^a

	MSW	MSMO	MSMW (No Current)	MSMW (Female)	MSMW (Male)	MSMW (Both)	<i>p</i>
Age (in years) M (SD)*	N = 6,613 (%) 29.3 (1.98)	N = 110 (%) 29.1 (1.72)	N = 66 (%) 29.2 (1.75)	N = 155 (%) 29.4 (1.73)	N = 97 (%) 29.2 (1.85)	N = 58 (%) 29.3 (1.65)	ns
Race/Ethnicity							<.001
White	3711 (56.8)	49 (45.4)	29 (44.6)	95 (61.7)	41 (42.7)	29 (50.0)	
Black	1322 (20.2)	18 (16.7)	17 (26.2)	28 (18.2)	25 (26.0)	13 (22.4)	
Hispanic	1042 (16.0)	29 (26.9)	11 (16.9)	27 (17.5)	25 (26.0)	15 (25.9)	
Asian	412 (6.3)	11 (10.2)	7 (10.8)	3 (2.0)	4 (4.2)	1 (1.7)	
Other	51 (0.8)	1 (0.9)	1 (1.5)	1 (0.7)	1 (1.0)	0 (0.0)	
Education							.01
HS or less	1,903 (28.8)	18 (16.4)	26 (39.4)	47 (30.3)	30 (30.9)	15 (25.9)	
College Grad	4,101 (62.0)	72 (65.5)	35 (53.0)	99 (63.9)	57 (58.8)	38 (65.5)	
More than College	609 (9.2)	20 (18.2)	5 (7.6)	9 (5.8)	10 (10.3)	5 (8.6)	
Household Income							<.001
Less 25K	828 (13.4)	21 (22.0)	17 (29.3)	35 (24.5)	19 (20.2)	14 (26.4)	
25K–49, 999	1,700 (27.5)	28 (26.4)	21 (36.2)	39 (27.3)	29 (30.9)	15 (28.3)	
50K–74,999	1,555 (25.1)	28 (26.4)	6 (10.3)	34 (23.8)	16 (17.0)	13 (24.5)	
75K–99,999	1,025 (16.6)	14 (13.2)	8 (13.8)	18 (12.6)	12 (12.8)	6 (11.3)	
Greater than 100K	1,089 (17.5)	15 (14.2)	6 (10.3)	17 (11.9)	18 (19.2)	5 (9.4)	
Functional Poverty							<.001
Poor	176 (2.7)	1 (0.9)	3 (4.6)	14 (9.0)	4 (4.1)	0 (0.0)	
Not	6426 (97.3)	109 (99.1)	63 (95.5)	141 (90.9)	93 (95.9)	58 (100.0)	
Married							<.001
Never	2797 (52.1)	96 (98.9)	38 (80.6)	67 (53.6)	67 (87.0)	38 (86.4)	
Once or more	2565 (47.8)	2 (1.0)	9 (19.2)	58 (46.4)	10 (13.0)	6 (13.6)	
Psychosocial Vulnerability Factors							
Substance Use Marijuana							<.001
No	2574 (39.2)	44 (40.0)	36 (55.4)	48 (31.0)	44 (45.8)	21 (36.8)	
Yes	3999 (60.8)	66 (60.0)	29 (44.6)	107 (69.0)	52 (54.2)	36 (63.2)	

	MSW	MSMO	MSMW (No Current)	MSMW (Female)	MSMW (Male)	MSMW (Both)	p
Coke							<.001
No	5071 (77.1)	77 (70.0)	50 (76.9)	104 (67.1)	70 (72.9)	32 (56.1)	
Yes	1509 (22.9)	33 (30.0)	15 (23.1)	51 (32.9)	26 (27.1)	25 (43.9)	
Meth							<.001
No	5868 (89.1)	92 (83.6)	52 (80.0)	123 (79.3)	79 (82.3)	44 (75.9)	
Yes	715 (10.9)	18 (16.4)	13 (20.0)	32 (20.7)	17 (17.7)	14 (24.1)	
Injection							0.61
No	126 (72.8)	0 (0)	2 (40.0)	8 (72.7)	4 (66.7)	3 (75.0)	
Yes	47 (27.1)	0 (0)	3 (60.0)	3 (27.3)	2 (33.3)	1 (25.0)	
Alcohol Use (Past 12 M)							0.11
No	412 (7.5)	1 (1.1)	5 (12.2)	14 (11.0)	4 (4.7)	4 (8.7)	
Yes	5090 (92.5)	90 (98.9)	36 (87.8)	113 (89.0)	81 (95.3)	42 (91.3)	
Drank Almost Daily (Past 12 M)							<.05
No	4412 (80.2)	73 (80.2)	31 (75.6)	93 (73.2)	61 (71.7)	39 (84.8)	
Yes	1090 (19.9)	18 (19.8)	10 (24.4)	34 (26.7)	24 (28.2)	7 (15.2)	
Recent Alcohol Use (30 D)							<.001
No	1720 (31.2)	19 (20.9)	18 (43.9)	40 (31.5)	22 (25.9)	15 (32.6)	
Yes	3782 (68.7)	72 (79.1)	23 (56.1)	87 (68.5)	63 (74.1)	31 (67.4)	
Depression (Ever Dx)							<.001
No	6035 (91.3)	87 (79.1)	55 (83.3)	129 (83.2)	73 (75.3)	44 (77.2)	
Yes	578 (8.7)	23 (20.9)	11 (16.7)	26 (16.8)	24 (24.7)	13 (22.8)	
Suicidal Ideation (Past 12 Months)							<.001
No	361 (5.5)	14 (12.7)	6 (10.0)	19 (12.3)	11 (11.7)	12 (21.1)	
Incarceration (Ever)							<.001
No	4598 (69.7)	95 (86.4)	39 (60.0)	104 (67.1)	76 (78.3)	33 (56.9)	
Yes	1995 (30.3)	15 (13.6)	26 (40.0)	51 (32.9)	21 (21.7)	25 (43.1)	
Ever Forced to Have Sex							<.001
No	6343 (96.1)	96 (87.3)	58 (89.2)	128 (82.6)	83 (85.6)	50 (87.7)	
Yes	260 (4.0)	14 (12.7)	7 (10.8)	27 (17.4)	14 (14.4)	7 (12.3)	

^aN for a given variables may not sum to column total due to missing values. MSW, MSM and MSMW are defined by self-reported gender of sex partners ever.

Table 2

Sexual Identity, STI and Partnership Patterns among MSW, MSMO, and MSMW in the United States^a

	MSW	MSMO	MSMW (No Current)	MSMW (Female)	MSMW (Male)	MSMW (Both)	p
	N = 6,613 (%)	N = 110 (%)	N = 66 (%)	N = 155 (%)	N = 97 (%)	N = 58 (%)	
Sexual Identity							
Heterosexual	6441 (97.5)	5 (4.6)	39 (59.1)	97 (62.6)	10 (10.5)	15 (26.3)	<.001
Bisexual	154 (2.3)	21 (19.1)	21 (31.8)	57 (36.8)	41 (43.2)	41 (71.9)	
Homosexual	0 (0)	82 (74.6)	6 (9.1)	0 (0.0)	40 (42.1)	1 (1.8)	
Other	9 (0.1)	2 (1.8)	0 (0.0)	1 (0.7)	4 (4.2)	0 (0.0)	
Romantic Attraction to Males							<.001
No	6550 (99.1)	6 (5.5)	47 (71.2)	133 (86.9)	12 (12.4)	33 (56.9)	
Yes	61 (0.9)	104 (94.6)	19 (28.8)	20 (13.1)	85 (87.6)	25 (43.1)	
Romantic Attraction to Females							<.001
No	52 (0.8)	97 (88.2)	14 (21.2)	1 (0.7)	61 (62.9)	4 (6.9)	
Yes	6555 (99.1)	13 (11.8)	52 (78.8)	152 (98.1)	36 (37.1)	54 (93.1)	
Ever Forced to Have Sex							<.001
No	6343 (96.1)	96 (87.3)	58 (89.2)	128 (82.6)	83 (85.6)	50 (87.7)	
Yes	260 (4.0)	14 (12.7)	7 (10.8)	27 (17.4)	14 (14.4)	7 (12.3)	
Recent Sex Trade							<.01
No	5679 (96.7)	92 (93.9)	N/A	143 (92.3)	90 (93.8)	53 (93.0)	
Yes	192 (3.2)	6 (6.1)		12 (7.7)	6 (6.3)	4 (7.0)	
Sexually Transmitted Infections							
Chlamydia (SR)	455 (7.0)	10 (9.3)	5 (8.3)	17 (11.1)	11 (11.7)	3 (5.3)	<.01
Gonorrhea (SR)	196 (3.0)	10 (9.3)	4 (6.7)	7 (4.6)	15 (16.0)	1 (1.8)	<.001
Syphilis (SR)	11 (0.2)	3 (2.8)	1 (1.7)	0 (0.0)	3 (3.2)	1 (1.8)	<.001
HSV (SR)	89 (1.4)	1 (0.9)	0 (0.0)	1 (0.7)	4 (4.3)	3 (5.3)	<.05
Warts (SR)	126 (1.9)	4 (3.7)	3 (5.0)	2 (1.3)	9 (9.6)	1 (1.8)	<.01
Any STD (SR)	835 (12.9)	28 (26.2)	12 (20.0)	27 (17.7)	35 (37.2)	6 (10.5)	<.001
Partnership Patterns							
Lifetime Number of Partners	16.9 (29.6)	33.4 (66.9)	11.5 (15.0)	31.8 (73.7)	25.1 (34.2)	26.3 (31.0)	
Median (IQR) Number of Lifetime Partners	8 (4,20)	12 (5,25)	7 (4,12)	15 (7,28)	14 (7,32)	22 (10,34)	

	MSW	MSMO	MSMW (No Current)	MSMW (Female)	MSMW (Male)	MSMW (Both)	p
Lifetime Number of Male Partners (M, SD)	N/A	33.4 (66.9)	4.2 (52.0)	8.9 (32.4)	23.3 (33.4)	10.1 (14.1)	
Median (IQR) Number of Lifetime Male Partners	N/A	12 (5.25)	2 (1.5)	2 (1.4)	10 (5.30)	5 (3.15)	
Lifetime Number of Female Partners (M, SD)	16.9 (29.6)	N/A	7.3 (13.9)	23.3 (47.8)	2.8 (5.13)	16.2 (22.8)	
Median (IQR) Number of Lifetime Female Partners	8 (4.20)		2 (1.6)	10 (4.20)	2 (1.4)	11 (5.20)	
Number of Partners Past 12 Months (M, SD)	1.99 (2.5)	6.59 (11.2)	N/A	2.98 (6.53)	4.18 (6.34)	4.91 (6.61)	
Median (IQR) Number Partners (12M)	1 (1.2)	3 (1.5)		1 (1.2)	2 (1.4)	3 (2.5)	
Number of Partners Male Past 12 Months (M, SD)	N/A	6.59(11.2)	N/A	N/A	4.18 (6.34)	1.91 (2.06)	
Median (IQR) Number Male Partners (12M)		3 (1.5)			2 (1.4)	1 (1.3)	
Number of Partners Female Past 12 Months (M, SD)	1. 99 (2.5)	N/A	N/A	2.98 (6.53)	N/A	3.0 (6.44)	
Median (IQR) Number Female Partners (12M)	1 (1.2)			1 (1.2)		1 (1.2)	
Age at First Sex (Anal) (M, SD)	21.3 (3.9)	19.5 (3.2)	18.4 (4.6)	19.2 (5.1)	18.9 (3.4)	19.0 (3.7)	<.001
Age at First Sex (Vaginal) (M, SD)	16.7 (3.1)	N/A	15.9 (5.8)	16.6 (3.3)	16.9 (4.1)	16.5 (3.8)	0.3
Age at First Sex (Oral) (M, SD)	17.1 (3.1)	17.5 (4.3)	15.2 (4.4)	16 (4.2)	15.7 (4.1)	15.4 (3.4)	<.001
Early Sex (<16 years of age)							<.001
No	4112 (66.1)	68 (70.1)	25 (55.6)	85 (59.0)	59 (65.5)	26 (51.0)	
Yes	2110 (33.9)	29 (29.9)	20 (44.4)	59 (41.0)	31 (34.4)	25 (49.0)	

^aN for a given variables may not sum to column total due to missing values. MSW, MSM and MSMW are defined by self-reported gender of sex partners ever.

Table 3

Unadjusted and Adjusted Models of Past 12 Months HIV-related Risk Behaviors Comparing MSW, MSMO, and MSMW in the United States

	Number	Weighted % with an STI in the Past 12 Months	UOR (95%CI)	AOR (95%CI)
Any STI				
MSW	316	4.9	Ref.	Ref.
MSMO	5	8.5	3.14 (1.43–6.88)	3.90 (1.75–8.68)
MSMW (Female)	13	8.5	3.39 (1.56–7.36)	2.94 (1.19–7.29)
MSMW (Male)	14	14.9	2.50 (1.06–5.89)	2.31 (0.91–5.86)
MSMW (Both)	4	7	2.13 (0.46–9.76)	2.60 (0.54–12.40)
High Number of Sex Partners				
MSW	1775	28.5	Ref.	Ref.
MSMO	63	61.2	4.93 (2.82–8.62)	5.06 (2.87–8.91)
MSMW (Female)	30	21.3	0.65 (0.35–1.17)	0.64 (0.34–1.21)
MSMW (Male)	40	45.5	2.74 (1.47–5.12)	2.82 (1.44–5.48)
MSMW (Both)	33	64.7	4.09 (1.82–9.15)	3.81 (1.70–8.52)
Concurrency				
MSW	1144	19.5	Ref.	Ref.
MSMO	37	37.8	2.43 (1.34–4.53)	3.01 (1.59–5.69)
MSMW (Female)	29	18.7	0.91 (0.57–1.46)	0.96 (0.59–1.56)
MSMW (Male)	39	40.2	3.10 (1.68–5.73)	3.14 (1.65–5.99)
MSMW (Both)	27	47.4	3.11 (1.53–6.34)	2.59 (1.10–6.06)
No Condom Use^a				
MSMO	18	18.4	Ref.	Ref.
MSW	2370	40.5	3.28 (1.54–6.97)	3.16 (1.34–7.46)
MSMW (Female)	61	39.4	3.06 (1.28–7.33)	2.68 (1.04–6.91)
MSMW (Male)	13	13.5	0.60 (0.18–2.00)	0.55 (0.15–2.03)
MSMW (Both)	13	22.8	1.50 (0.52–4.33)	0.65 (0.19–2.24)
Involvement in Exchange Sex				
MSW	196	3.2	Ref.	Ref.
MSMO	6	6.1	2.00 (0.57–7.07)	2.02 (0.53–7.78)
MSMW (Female)	12	7.7	2.81 (1.15–6.88)	3.31 (1.39–7.87)
MSMW (Male)	6	6.3	3.07 (0.70–13.43)	2.82 (0.60–13.12)
MSMW (Both)	4	7	0.69 (0.92–0.25)	0.78 (0.11–5.75)

Note. All MV models adjusted for age, race/ethnicity, education, household income. MSMW with neither male or female partners in the past 12 months are excluded. MSM was the referent group for the last model of the association between sexual behavioral category and unprotected sex.

^aReferent category is MSMO vs. MSMW