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Non-volitional Sex and HIV-related Sexual Risk Behaviors among Men Who Have Sex with Men in the United States

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Abstract

Objective—We estimated the prevalence of lifetime non-volitional sex (NVS) among men who have sex with men (MSM) by demographic characteristics, and characterized its association with HIV-related sexual risk behaviors among MSM in the United States.

Design—National Survey of Family Growth (NSFG) is a nationally representative cross-sectional survey of the United States.

Methods—NSFG data from recent cycles 2002, and 2006–2010 were weighted and analyzed for males aged 18–44 years who reported ever having anal or oral intercourse with another male. Associations of lifetime NVS (forced sex by males or females) and age of first NVS experience (<18 vs. ≥18), with HIV-related sexual risk behavior outcomes in the past 12 months (i.e., sex with ≥2 male sex partners; exchanged sex for money or drugs; sex with injection drug user (IDU); sex with HIV-positive person; sex with ≥2 female sex partners) were assessed using adjusted prevalence ratios.

Results—An estimated 3,226,872 or 5.8% of men aged 18–44 years were identified as MSM with 24.6% of them reporting ever experiencing NVS. MSM reporting NVS at ≥18 years were more likely to have had sex with an IDU (aPR=4.40; 95%CI: 1.78–10.88), and exchanged sex for money or drugs (aPR=2.52; 95%CI: 1.17–5.43) in the past 12 months compared to those not reporting NVS. NVS for MSM <18 years was associated with exchanging sex for money or drugs.

Conclusion—Effective interventions to raise awareness of NVS among MSM, and to offer support for MSM who have experienced NVS are needed.

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None

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Keywords

Violence; MSM; HIV

INTRODUCTION

Sexual violence (SV) is a complex phenomenon involving different factors that interact at a personal, community and social level.¹ An estimated three million men per year in the United States, including gay and bisexual men, are victims of SV.²⁻⁶ In 2010, the lifetime prevalence of SV other than rape is estimated to be 40.2% for gay men and 47.4% for bisexual men in the United States.⁷ A few small-scale studies have reported percentage of lifetime SV among men who have sex with men (MSM) ranging from 18.9%⁸ to 30.4%⁹ in the United States. However, direct comparisons are difficult to make because of differences in the survey methodologies, the measures used, study design, recall period, and the population under study. Some previous studies have assessed the associations of SV, such as mental health problems, substance abuse and receptive anal intercourse with a non-monogamous partner without a condom,^{4, 6, 10} while other studies reported on factors preceding SV, for instance age, socioeconomic status, and HIV status.¹¹ The majority of studies have simply examined associated factors. Nonetheless, there is mounting evidence that experiencing SV is associated with sexual behaviors among gay and bisexual men that increase the risk of HIV, such as anal sex without a condom.^{4, 5, 12} The relationship between SV and sexual risk behaviors among MSM is particularly important to study, as MSM account for more than half of the new HIV infections in the United States.¹³

SV may be associated with HIV acquisition or with HIV transmission. Nonetheless, certain sexual risk behaviors that could lead to the acquisition of HIV, such as receptive anal intercourse without a condom, have been reported among MSM who are in abusive relationships.³⁻⁶ In one study, over 90% of gay and bisexual men who experienced sexual coercion reported at least one episode that involved anal sex without a condom.¹² Furthermore, a higher prevalence of sexually transmitted infections (STIs)¹² has been reported among sexually coerced men compared to those who did not report sexual coercion, suggesting SV is a potential risk factor for STIs, including HIV, in this population.

Limited small scale studies have shown the association of SV and HIV risk-taking behaviors among MSM.^{4, 5, 14} Data from a convenience sample of gay and bisexual men attending urban sexually transmitted disease clinics in Chicago, Denver, and San Francisco indicated that MSM who were sexually abused during childhood or adolescence were significantly more likely to report high-risk sexual behaviors such as anal intercourse without a condom, injection drug use, and increased risk of STIs including HIV infection.¹⁴ Similarly, SV in adulthood among men recruited from a large gay pride event in Atlanta, Georgia, in 2001 was found to be associated with increased reporting of high-risk sexual behaviors and symptoms of dissociation, trauma-related anxiety, and borderline personality disorders.⁶ However, we are not aware of any study to date that has examined the association of SV and HIV-related sexual risk behaviors among MSM in a nationally representative U.S. sample.

The term “sexual violence” is used to represent “many behaviors that may otherwise fall under the rubrics of sexual abuse, sexual assault, and any other sexual violations”.¹⁵ In some settings, other terms like “sexual harassment” have been used to describe SV.¹⁵ CDC has developed uniform definitions of SV.¹⁵ A recent study from the third national survey of sexual attitudes and lifestyles in Britain¹⁶ suggested that sex against one’s will may be defined as non-volitional sex (NVS). NVS is “sexual behavior that violates a person’s right to choose when and with whom to have sex and what sexual behaviors to engage in”.¹⁷

The aims of this study are to use a nationally representative cross-sectional health survey to characterize among MSM 1) the prevalence of lifetime NVS by demographic characteristics, 2) the circumstances leading to NVS and gender of perpetrator 3) the association between NVS and HIV-related sexual risk behaviors in the past 12 months, and 4) the association between the age of first NVS and HIV-related sexual risk behaviors in the past 12 months.

METHODS

Data source and study population

The National Survey of Family Growth (NSFG) is a cross-sectional health survey representative of the civilian, non-institutionalized population of the United States aged 15–44 years. The sample is a nationally representative multistage area probability sample. The NSFG oversamples respondents of Hispanic and black race/ethnicity and adolescents and randomizes the probability sample for each survey cycle in order to produce reliable estimates representative of the time period during data collection.^{18, 19} The selected addresses were visited by trained interviewers in person, and a short “screener” interview was conducted to see if anyone 15–44 years of age lived there.^{18, 19} If so, interviews were administered by trained interviewers to one randomly selected resident from each household. All respondents were given written and oral information about the survey, and all interviews were voluntary and confidential. A total of 12,571 and 22,682 male and female participants completed the interview in the 2002 cycle and the 2006–2010 NSFG continuous cycle, with corresponding response rates of 79% and 77%, respectively. The details of the NSFG sample design, weighting methodology, and variance estimation are described elsewhere.^{18, 19} Information on NVS and HIV-related sexual risk behaviors were collected using Audio Computer-Assisted Self-Interviewing (ACASI) to give respondents greater privacy when reporting this sensitive information. To increase the sample size and to increase estimate stability, data from the 2002 cycle and 2006–2010 continuous cycle of the NSFG were combined. For the sake of comparison, we used data on NVS among MSM and other males. We restricted the main analyses to men aged 18–44 years who reported ever having anal or oral intercourse with another man, i.e., MSM (n=922).

Measures

Independent variables: Male respondents were asked if they had ever been forced by a male or female to have vaginal, oral or anal sex with a male or female against their will. Respondents who answered “yes” to ever being forced to have vaginal, oral, or anal sex by either a male or female against their will as having experienced NVS. MSM who reported ever having anal or oral sex with a male, and vaginal, anal or oral sex with a female, were

classified as men who have sex with men and women (MSMW). A question on age of first NVS was categorized as <18 years or ≥18 years. Respondents who reported having experienced NVS were also asked about the gender of the perpetrator and the circumstances in which the NVS occurred. The questions regarding the circumstances in which NVS occurred included: if the respondent was given alcohol or drugs; if the perpetrator was “bigger or grown-up” and respondent was younger; if the perpetrator threatened to end the relationship if the respondent did not agree to have sex; if the respondent was pressured by the perpetrator’s words but was not threatened with harm; if the perpetrator threatened the respondent with physical hurt or injury; if the respondent was physically hurt or injured by the perpetrator; and if the respondent was physically held down by the perpetrator.

Additional demographic and health-related covariates included race/ethnicity (non-Hispanic white, non-Hispanic black, other non-Hispanic race, and Hispanic); age range (18–24, 25–34, 35–44); marital status (unmarried/not cohabiting, married/cohabiting); education (less than a high school diploma, high school graduate, some college, and four or more years of college); income classified according to the Federal Poverty Guidelines (<100%, or ≥100% of the poverty threshold)²⁰; and self-reported sexual orientation (heterosexual, homosexual, bisexual).

Outcome variables: The outcomes considered in the analysis were HIV-related sexual risk behaviors in the past 12 months i.e., ≥2 male sex partners, sex with an injection drug user [IDU], sex with an HIV-positive person, exchanged sex for money or drugs, and ≥2 female sex partners. The Centers for Disease Control and Prevention (CDC) considers these behaviors to confer a high risk for HIV infection, indicating the need for annual HIV testing^{21, 22}

Statistical analysis

The study sample was weighted to produce national U.S. estimates using methods and procedures proposed by the National Center for Health Statistics to account for weighting based on selection probability, non-response and sampling differences between regions. Analyses represent average weighted estimates from 2002 and 2006–2010 because we combined the 2002 and 2006–2010 cycles.²³ Weights were adjusted to account for multiple years of data collection during survey cycles. In addition, survey cycle was included in subsequent logistic regression models to adjust for population variability among years of data collection. We first estimated the prevalence of NVS among MSM and other males. We then described characteristics of MSM who had or had not ever experienced NVS. For MSM who had experienced NVS, we described the gender of the perpetrator, age they first experienced NVS and circumstances leading to NVS, using weighted percentages. We also investigated the association between experience of NVS with each of six outcomes representing HIV-related sexual risk behaviors in the past 12 months (≥2 female sex partners, sex with an IDU, sex with an HIV-positive person, exchanged sex for money or drugs, and ≥2 male sex partners).

We used predicted marginals and prevalence ratios (PR) along with 95% confidence intervals (CIs) derived from logistic regression models²⁴ for each risk behavior, to compare

MSM who had and had not experienced NVS, before and after adjusting for the other variables, including survey cycle, age, race/ethnicity, marital status, income, and sexual orientation. We then compared the unadjusted and adjusted PRs for each outcome, comparing MSM who had and had not experienced NVS, to assess how the associations changed with the inclusion of the other variables in the model. We repeated this same procedure to compare MSM who first experienced NVS at age <18 year and 18 years with MSM who had not experienced NVS. The models were controlled for specific demographic and health-related covariates significant in bivariate analysis at $p < 0.05$ and year of survey cycle. Because this study reports secondary data analysis of a de-identified publicly available dataset, CDC institutional review board approval was not required. All analyses were performed using SUDAAN 10.0.1 (Research Triangle Institute, Research Triangle Park, NC).

RESULTS

A total of 3,226,872 (95% confidence interval [CI]: 2,843,305–3,610,438) or 5.8% of men aged 18–44 years in the United States were estimated to be MSM, and 795,182 (24.6%; 95% CI: 20.4–29.4) of these men reported ever experiencing NVS. Only 5.9% of non-MSM reported ever having experienced NVS, thus NVS was four times as prevalent among MSM as among other males. Of all MSM in our sample 85.6% were estimated to be MSMW, and 26.0% of these reported ever experiencing NVS. The proportion of black MSM (42.0%) who reported NVS was higher than the proportion of non-Hispanic white MSM (21.9%) who reported NVS; there was no difference for other race/ethnicities compared with non-Hispanic whites (Table 1). The proportion of MSM with less than a high school education who reported experiencing NVS (37.0%) was greater than the proportion among men who had graduated from college (16.9%). Similarly, the proportion experiencing NVS was greater among those who earned less than the poverty thresholds (35.8%) than among those who earned 100% or more (22.3%).

Among MSM who had reported NVS, more than half (59.6%) reported that the perpetrator was male, while 30.1% reported that the perpetrator was female. An additional 10.3% reported experiencing NVS by both male and female perpetrators (Table 2). The majority (71.0%) of MSM who reported NVS first experienced NVS before age 18 years. Among MSM who reported NVS, the most common circumstance was the use of verbal pressure without threats of harm (65.8%) followed by the perpetrator's size difference (i.e. he/she was reported by the respondent to be bigger/stronger) (63.6%), and being physically held down (40.2%). Being threatened with physical hurt or injury (38.9%), and being given drugs or alcohol (37.9%) were also commonly reported among MSM who experienced NVS.

The results from multivariate modeling are presented in Table 3 and supplemental Tables 2 and 3 (for details of bivariate analyses please see supplemental Table 1). Compared with MSM not reporting NVS, MSM reporting NVS were more likely to have engaged in at least one HIV-related sexual risk behavior in the past 12 months (PR=1.34; 95% CI: 1.06–1.68). After controlling for covariates, the relationship between ever experiencing NVS and engaging in at least one HIV-related sexual risk behavior in the past 12 months was not significant (aPR=1.24; 95% CI: 0.98–1.56). The relationship was significant between ever

experiencing NVS and having sex with an IDU in the past 12 months (aPR=2.42; 95% CI: 1.10–5.32) and exchanging sex for money or drugs in the past 12 months (aPR: 2.62; 95% CI=1.44–4.76).

After controlling for covariates, MSM reporting NVS at 18 years of age or older were more likely to have had at least one HIV-related sexual risk behavior in the past 12 months (aPR=1.39; 95% CI: 1.09–1.77) compared with men who had not experienced NVS. MSM reporting NVS at 18 years of age or older were more likely to have had sex with an IDU (aPR=4.40; 95% CI: 1.78–10.88), and exchanged sex for money or drugs (aPR: 2.52; 95% CI=1.17–5.43), as compared with MSM who did not report NVS. Experiencing NVS at age < 18 years was only associated with exchanging sex for money or drugs in the past 12 months (aPR: 2.67; 95% CI=1.45–4.93).

DISCUSSION

An estimated 3.2 million or 5.8% U.S. men aged 18–44 years were reported as MSM in this analysis, a proportion that is close to what has been estimated previously by the CDC.²⁵ Almost one-quarter (24.6%) of these MSM reported ever experiencing NVS, which is four times as prevalent as among other males in the United States. The high prevalence of NVS among MSM warrants further investigation. NVS may be even higher if MSM are reluctant to report such experiences.^{26, 27} Although other investigators have used the term “sexual violence,” “non-volitional sex” more closely reflects the wording of the NSFG question about these experiences. Regardless of the degree of coercion, having sex against one’s will represents a violation of sexual autonomy, and is therefore a form of SV. Earlier studies have shown that sexual coercion and SV perpetrated by one or more partners among MSM is often associated with sex without the use of condoms.^{12, 28} Given the high rates of HIV and STI among MSM,¹² NVS may increase the likelihood of HIV transmission to this population, which is already vulnerable to acquiring HIV infection. Additionally, the threat or fear of violence, especially if the perpetrator is bigger or more grown-up than the victim, and among those who experienced NVS at the age lesser than 18 years, may compromise negotiation of condom use, which places victims at risk for HIV acquisition. Further research is needed to understand the risk factors and health consequences associated with NVS among MSM in the U.S. Our findings demonstrate a need for effective interventions for MSM who have experienced NVS, especially those who were abused before the age of 18 years.

We found that a majority of MSM respondents who experienced NVS reported that males were the perpetrators of the NVS, although a sizable proportion of MSM reported that the perpetrator of the NVS was female (30.1%). In our study we found that NVS was associated with the victim when he/she either felt verbal pressure or reported that the perpetrator was bigger or more grown-up than the victim. Although information characterizing the type of relationship between victim and perpetrator was not available in the NSFG data we analyzed, previous research suggests that most male victims report that SV, stalking, and intimate partner violence are perpetrated by someone they know, such as a current or former intimate partner or acquaintance.²⁹

SV experienced by MSM is associated with a wide array of mental health problems, ranging from anxiety and mood disorders to borderline personality disorders and attempted suicide.^{6, 10} Other studies have found that social marginalization and lack of social support among MSM may make those who are victims of sexual abuse particularly vulnerable to engaging in sexual risk behaviors.^{14, 30} The stigma and discrimination that is often experienced by MSM³¹ as a result of their sexual orientation and behavior may also exacerbate mental distress, and thereby increase sexual risk in MSM who are victims of sexual abuse.³² In this analysis, we were unable to investigate these factors as possible intermediaries through which NVS might operate to increase sexual risk behavior. However, our analysis of this large population-based sample of MSM provides further evidence of an association between NVS and sexual risk behavior that has been reported from smaller-scale studies.^{6, 14} MSM who reported NVS at age 18 years or older were more likely to have had sex with an IDU, and exchanged sex for money or drugs in the past 12 months, as compared with males who did not experience NVS. The only association that we found between experiencing NVS before 18 years of age and risk behavior was with exchanging sex for money or drugs. It is possible that individuals experiencing NVS at age 18 years or older may have been exposed to more severe form of NVS than those experiencing NVS before 18 years of age. This, in turn, may explain the association between NVS at age 18 years or older and increased sexual risks in our sample. Further qualitative and longitudinal quantitative studies are needed to characterize how NVS is related to future sexual risk behaviors among MSM.

This analysis has a few limitations. First, due to the cross-sectional design, we could not address whether NVS leads to HIV-related sexual risk behaviors or if risk behaviors predated the NVS (for those 18 years old); we could only document that an association exists. Second, NVS was self-reported by the participants and is therefore subject to recall and social desirability bias. Nonetheless, use of ACASI for providing sensitive information on NVS and HIV-related sexual risk behaviors may have helped to reduce these biases among the participants. Thirdly, NVS may have occurred when participants were young. In such cases, the circumstances of the abuse and the characteristics of the perpetrator may not be related to current risk behaviors such as condomless sexual behavior. Consistent and correct use of male condoms during sex has been shown to be an effective way to prevent STIs, including HIV.^{33–35} Lack of condom use, particularly if one of the partners is HIV-positive or has unknown serostatus, may also be considered a high-risk sexual behavior in some circumstances. However, essential information in NSFG such as HIV serostatus, condom use in serodiscordant partnering, and consistent use of condoms during sex is not available. Therefore, we were not able to assess non-use of condoms among MSM as a separate outcome in our analysis. Lastly, because of a lack of certain information in NSFG, we were not able to control for factors such as violence in participants' families or within their communities that may be confounders. Despite these limitations, to our knowledge, this is the first study that estimated the prevalence of NVS among MSM using nationally representative data. Additionally, we describe the circumstances of NVS, which have not previously been reported in the literature.

In conclusion, one quarter of MSM reported NVS, which was four times as high as for non-MSM. Experience of NVS was associated with HIV-related sexual risk behaviors with

different associations depending on the age at first NVS experience. Effective interventions to raise awareness of NVS among MSM, and to offer support for MSM who have experienced NVS, especially those who were abused before 18 years of age, are needed. Healthcare providers might help MSM develop safe disclosure plans, particularly with patients who have revealed that violence is a concern. CDC's report, "Essentials for Childhood Framework", provides evidence-based strategies for communities to promote safe, nurturing relationships and environments for children to prevent violence from occurring.³⁶ More qualitative and longitudinal quantitative research studies are needed to understand the relationship between NVS, HIV-related sexual risk behaviors, and HIV acquisition.

Supplementary Material

Refer to Web version on PubMed Central for supplementary material.

Acknowledgments

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Table 1

Associations of selected characteristics of men who have sex with men[†] aged 18–44 years who have experienced non-volitional sex^{††}: National Survey of Family Growth, 2002 and 2006–2010

Characteristics	Ever experienced non-volitional sex				Prevalence Ratio ^{††††}	95% CI
	Yes		No			
	N (weighted)	Weighted % ^{††††}	N (weighted)	Weighted % ^{††††}		
Age (years)						
18–24	192,215	25.7	55,937	74.3	1.19	0.76–1.87
25–34	294,489	28.2	750,600	71.8	1.31	0.87–1.98
35–44	308,477	21.5	1,125,153	78.5	Reference	
Race/Ethnicity						
Hispanic	141,730	27.4	375,377	72.6	1.25	0.84–1.86
Non-Hispanic black	127,028	42.0	175,522	58.0	1.91	1.28–2.86
Other	30,561	21.9	109,017	78.1	1.02	0.36–2.90
Non-Hispanic white	495,862	21.9	1,771,774	78.1	Reference	
Marital status						
Unmarried, not cohabitating	541,532	25.7	1,568,072	74.3	1.13	0.76–1.67
Married, cohabitating	253,650	22.7	861,590	77.3	Reference	
Education level						
Less than high school diploma	164,978	37.0	280,631	63.0	2.19	1.27–3.76
High school graduate	237,482	24.8	719,974	75.2	1.45	0.85–2.46
Some college education	254,597	25.3	752,157	74.7	1.49	0.93–2.38
4 year college education	138,125	16.9	678,927	83.1	Reference	
Income as % of poverty level						
< 99%	203,089	35.8	364,083	64.2	1.61	1.09–2.40
100%	592,093	22.3	2,067,607	77.7	Reference	
Sexual Orientation						
Homosexual	190,137	20.4	740,441	79.6	0.73	0.50–1.06
Bisexual	106,275	21.2	394,245	78.8	0.75	0.44–1.28
Heterosexual	462,182	28.1	1,179,540	71.9	Reference	

Characteristics	Ever experienced non-volitional sex				Prevalence Ratio ^{††††}	95% CI
	Yes	No	Weighted % ^{†††}	Weighted % ^{†††}		
Men who have sex with men and women (MSMW)						
Yes	719,186	2,043,641	26.0	74.0	1.58	0.94 – 2.65
No	75,996	388,048	16.4	83.6	Reference	
TOTAL	795,182	2,431,689	24.6	75.4		

[†] Men who have sex with men were defined as respondents who reported ever having oral or anal intercourse with another man

^{††} Non-volitional sex was defined as having been forced by a male or female to have vaginal, oral or anal sex against one's will.

^{†††} Row percentage

^{††††} Adjusted for year of survey cycle.

-Abbreviations: CI: Confidence Interval

Table 2

Gender of assailant, age, and circumstances leading to experiences of non-volitional sex[†] among men who have sex with men^{††} aged 18–44 years: National Survey of Family Growth; 2002, 2006–2010

Characteristic	N (weighted)	Weighted %
Gender of assailant		
Male	474,273	59.6
Female	239,170	30.1
Both	81,739	10.3
Age of respondent at first non-volitional sex (years)		
< 18	563,860	71.0
18	229,970	29.0
Circumstances leading to non-volitional sex^{†††}		
Pressured by his/her words, but without threats of harm		
Yes	523,511	65.8
No	271,671	34.2
Did what was told because he/she was bigger or grown-up than you		
Yes	505,810	63.6
No	289,372	36.4
Physically held down		
Yes	318,177	40.2
No	472,754	59.8
Threatened with physical hurt or injury		
Yes	268,009	33.9
No	522,922	66.1
Given drugs or alcohol		
Yes	301,416	37.9
No	493,766	62.1
Physically hurt or injured		
Yes	189,634	24.0
No	601,297	76.0
Were told that relationship would end if you didn't have sex		
Yes	179,238	22.5
No	615,944	77.5

[†] Non-volitional sex was defined as having been forced by a male or female to have vaginal, oral or anal sex against one's will.

^{††} Men who have sex with men were defined as respondents who reported ever having oral or anal intercourse with another man.

^{†††} The categories are not mutually exclusive. A person may have one or more of these circumstances leading to sexual violence.

Table 3

Results of multivariate logistic models of the association of experienced non-volitional sex[†] and age at first non-volitional sex with six HIV-related sexual risk behaviors in the past 12 months among men who have sex with men^{††} aged 18–44 years: National Survey of Family Growth; 2002, 2006–2010

	Any Sexual risk indicators, past 12 months ¹	2 female sex partners ²	Had sex with injection drug user ³	Had sex with HIV-positive person ⁴	Exchanged sex for money or drugs ⁵	2 male sex partners ⁶
	aPR (95%CI)	aPR (95%CI)	aPR (95%CI)	aPR (95%CI)	aPR (95%CI)	aPR (95%CI)
Ever experienced non-volitional sex						
Yes	1.24 (0.98–1.56)	1.32 (0.93–1.89)	2.42 (1.10–5.32)	2.00 (0.89–4.52)	2.62 (1.44–4.76)	1.20 (0.86–1.67)
No	Reference	Reference	Reference	Reference	Reference	Reference
Age of first non-volitional sex experience						
< 18 years	1.17 (0.89–1.54)	1.30 (0.86–1.95)	1.45 (0.54–3.87)	2.07 (0.81–5.28)	2.67 (1.45–4.93)	1.05 (0.68 – 1.63)
18 years	1.39 (1.09–1.77)	1.40 (0.82–2.39)	4.40 (1.78–10.88)	1.84 (0.68–5.00)	2.52 (1.17–5.43)	1.50 (0.98 – 2.29)
Never experienced sexual violence	Reference	Reference	Reference	Reference	Reference	Reference

[†] Non-volitional sex was defined as having been forced by a male or female to have vaginal, oral or anal sex against one's will.

^{††} Men who have sex with men were defined as respondents who reported ever having oral or anal intercourse with another man.

¹ Adjusted for year of survey cycle, age, race/ethnicity, marital status, income, and sexual orientation

² Adjusted for year of survey cycle, age, race/ethnicity, education, income, sexual orientation

³ Adjusted for year of survey cycle, and income

⁴ Adjusted for year of survey cycle, marital status, sexual orientation, and men who have sex with men and women (MSMW)

⁵ Adjusted for year of survey cycle, race/ethnicity, education, and income

⁶ Adjusted for year of survey cycle, race/ethnicity, marital status, sexual orientation, and MSMW

(Covariates included in each model were associated at p<0.05 in bivariate analysis)

Abbreviations: aPR: Adjusted Prevalence Ratio; CI: Confidence Interval