Published in final edited form as:

Can J Hum Sex. 2019 August ; 28(2): 215–225. doi:10.3138/cjhs.2019-0014.

Generational differences in sexual behaviour and partnering among gay, bisexual, and other men who have sex with men

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Abstract

Introduction—Given that different generations of gay, bisexual, and other men who have sex with men (gbMSM) have been influenced by substantially different life course events and cultural contexts, we explored differences in sexual behaviour between millennials, Gen-Xers, and baby boomers.

Methods—Sexually active gbMSM from Metro Vancouver, ≥16 years, were recruited using respondent-driven sampling between 2012–2015 and completed computer-assisted self-interviews every 6 months, up to 2017. To explore differences between generations (millennials born ≥1987, Gen-Xers born 1962–1986, baby boomers born <1962) we used multivariable logistic regression models using baseline, RDS-weighted data. We also examined 6-month trends, stratified by generation, in partner number, prevalence of high-risk sex, and relationship status using hierarchical mixed-effects models.

Results—Among 774 gbMSM (190 millennials, 469 Gen-Xers, 115 baby boomers), median age of first anal sex with a male partner decreased from 20 (aQ1,aQ3:17,25) among baby boomers to 18 (aQ1,aQ3: 16,20) among millennials (x^2 (DF=2, N=764)=12.920, p=0.002). After controlling for relevant demographics, differences were observed for some sexual behaviours (i.e., anal sex positioning, giving oral sex, sex toys, masturbation, sexual app/website use, transactional sex) but not others (i.e., receiving oral sex, rimming, fisting, watersports, group sex). At baseline, millennials reported less high-risk sex than other generations but all trended toward less high-risk sex, fewer partners, and regular partnering over the course of the study.

Conclusions—While there was notable similarity across generations, millennial gbMSM reported earlier age at first anal intercourse and less high-risk sex. However, all generations trended towards less high-risk sex, fewer partners, and regular partnering over time.

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Sexual behaviours of gay, bisexual, and other men who have sex with men (gbMSM) have primarily been examined from a risk-reduction perspective (Berg, 2009; Carter et al., 2017). This is understandable from a public health standpoint as identifying and targeting risky sexual behaviour can reduce HIV prevalence (Hallet et al., 2006; Herbst et al., 2005); however, it can also stigmatize certain sexual behaviours and relationships. Furthermore, this narrow focus ignores important sexual motivators such as pleasure and relationship factors (Covenay & Bunton, 2003).

It has been proposed that an individual's development, including their sexuality and behaviour, is significantly impacted by historical events and context during particular life stages (Elder, 1998; Elder, Johnson, & Crosnoe, 2003). This life course perspective is particularly relevant when considering gbMSM in Canada and elsewhere in North America as there have been significant social, political, and technological changes over the past half century, including the Pride Movement, increases in LGBTQ rights, the AIDS epidemic and subsequent advancement in treatments, the legalization of same-sex marriage, and the proliferation of sex-seeking websites and apps. Each of these is associated with particular social and cultural contexts that are likely to have had varying effects on the development of different generations of gbMSM (Hammack, 2005; Hammack & Cohler, 2011). When applied to gay men's health and identity, Hammack et al. (2018) suggest two critical periods of development: puberty and emerging adulthood, as these correspond with a recognition of sexual desires and an increase in sexual activity and community involvement, respectively (McClintock & Herdt, 1996; Morgan, 2013; Savin-Williams & Diamond, 2000). Through application of the life course theory, three distinct generations of Canadian gbMSM emerge.

First, for the generation of gay and bisexual men born prior to the 1960s, otherwise known as the baby boomers, they experienced puberty or emerging adulthood during a time when the discourse on homosexuality was shifting. With the decriminalization of homosexuality in Canada and the Stonewall riots in New York City in 1969, and the removal of homosexuality as a mental disorder from the DSM in 1973, the Gay Liberation Movement gained momentum and gay communities became visible. While likely identifying and coming out at an older age than later generations, most baby boomers would have been sexually active before the emergence and awareness of HIV/AIDS in the 1980s, resulting in a significant proportion of this generation affected by the AIDS epidemic during their mid-adult years.

Second, Generation X, those born from the early 60s to mid-80s, experienced puberty after the events that defined the prior cohort, and developed their sexual identity in a world where same-sex attraction was legal and gay pride established, but discrimination was still present. Importantly, this generation of men was entering adulthood and engaging in sexual behaviour for the first time during the height of the AIDS epidemic. They were witness to thousands of gay men contracting HIV/AIDS and ultimately dying from lack of any available treatment. This sparked these men to engage in preventative behaviours such as increased condom use and vocal HIV/AIDS advocacy (Catania et al., 1991; Moran, Janes, Peterman, & Stone, 1990).

Finally, millennials, born after the mid-80s, reached puberty after the height of the AIDS epidemic and during a time when reliable anti-retroviral therapy was available and newer

treatment advances have made it possible for men living with HIV to lead relatively full and healthy lives (e.g., Hogg et al., 2017; Marcus et al., 2016). Prevention strategies now include biomedical interventions and behavioural strategies that have shifted the conceptualization of what is, or is not, “safe sex”. Additionally, as gay marriage was legalized in Canada in 2005, this generation entered adulthood with marriage as an option, redefining how they see their future relationships.

As the development of gay and bisexual men is influenced by the social and cultural contexts in which they mature, the changing social and historical environment over the past few decades has created distinct generations of gbMSM with unique perspectives and practices. While precise dates for each generation often differ, a generation has been defined as “an identifiable group that shares birth years, age, location, and significant life events at critical developmental stages” (Tolbize, 2008). As our analysis aimed to explore how sexual behaviour and relationship formation varies by generation, we compared baby boomers (born before 1962 and consequently all over the age of 18 when the HIV/AIDS epidemic began), Gen Xers (born 1962 – 1986 and consequently coming of age during the height of the HIV/AIDS epidemic) and millennials (born 1987 and later and consequently all over the age of 18 when same-sex marriage was legalized in Canada). We also sought to explore how some of those behaviours may vary over time during the course of this study from 2012–2017.

Methods

Participants

Data were drawn and analyzed from participants enrolled in the Momentum Health Study, a prospective longitudinal cohort study of gbMSM based in Metro Vancouver, Canada. Participants were recruited using respondent-driven sampling (RDS; Heckathorn, 2002) between February 2012 and February 2015. As per RDS methodology, initial “seeds” were recruited through partner community agencies and targeted advertisements to initiate chains of peer referrals. All participants received up to six vouchers that they were encouraged to give to eligible acquaintances. Participants were reimbursed $50 CAD for each study visit and $10 for each additional participant they successfully recruited. To be eligible for the study, participants had to be currently living in Metro Vancouver, be 16 years of age or older, gender identify as male, report having had sex with another man in the past six months, and be able to complete the questionnaire in English.

Study Procedures

After written informed consent was obtained, participants completed a computer-assisted self-interview (CASI) which included questions regarding demographics, sexual and drug using behaviours, and psychosocial attributes. As part of the larger study, after completion of the survey, a study nurse administered a point-of-care HIV test to HIV-negative individuals or drew blood for CD4 count and viral load testing for HIV-positive individuals; all participants were also screened for other sexually transmitted inflections. Participants were also invited to participate in a longitudinal cohort. Those who consented repeated the baseline study procedures every 6 months up to February 2017. Additional details on the

study protocol are published elsewhere (Lachowsky et al., 2016; Moore et al., 2016). All procedures of this study received human ethics clearances from the University of British Columbia, Simon Fraser University, and the University of Victoria.

Statistical Analyses

In order to explore potential differences in sexual behaviours and relationship formation between each of the three generations, we considered generation as the explanatory variable and classified participants as baby boomers (born before 1962), Gen Xers (born 1962–1986), and millennials (born 1987 and later). As it was the middle category and thus potentially more similar to each of the other groups, Generation X was treated as the reference level in univariable and multivariable logistic and linear regression models using baseline, RDS-weighted data. Independent variables included socio-demographics (i.e., sexual orientation, ethnicity, current relationship status, and self-reported HIV status) and sexual behaviour engaged in over the previous 6 months, including number of partners. Additionally, we asked participants to report their preferred anal sex position (top, bottom, versatile, or prefer no anal sex) and whether they had ever engaged in transactional sex. Multivariable analyses controlled for demographic variables including: sexual orientation, ethnicity, self-reported HIV status, and relationship status.

In order to examine potential changes in sexual behaviour over the course of the study, we examined six-month trends using hierarchical mixed-effects models to account for dependence of observations within recruitment chain and subject. Specifically, we considered trends in partnering (i.e., percentage of participants during each time period who reported having a regular partner compared with those who were single), number of male sex partners, and prevalence of high-risk sex (i.e., 4-level ordinal variable: no anal sex, no condomless anal sex, condomless anal sex only with same HIV serostatus partner(s), condomless anal sex with serodiscordant or unknown HIV-status partner(s)). Trends were analysed for each generation from February 2012 to February 2017.

Results

Sample Characteristics

Of the 774 participants who completed the baseline visit, 115 (18.1%, RDS-adjusted) were baby boomers, 469 (59.0%) were Generation X, and 190 (22.8%) were millennials. Table 1 presents the crude and RDS-adjusted descriptive statistics for the total sample, as well as for each generation. The majority of the participants were white (68.7%, RDS-adjusted), identified as gay (79.9%), were HIV-negative/unknown (78.6%), and were single (62.4%). Based on RDS estimated population parameter estimates, the median age of baby boomers at baseline was 55 years (Adjusted First Quartile [aQ1], Adjusted Third Quartile [aQ3]: 53, 60), Gen Xers had a median age of 36 years (aQ1, aQ3: 30, 43), and millennials had a median age of 23 years (aQ1, aQ3: 21, 24). The median age at first oral sex with a male partner did not vary by generation (millennials and Gen Xers: 16 years, baby boomers: 17 years, $x^2(DF=2, N=773)=1.992$, $p=0.369$); however, the median age of first anal sex with a male partner significantly decreased from 20 (aQ1, aQ3: 17, 25) in the baby boomer generation to 18 (aQ1, aQ3: 16, 20) in millennials ($x^2(DF=2, N=764)=12.920$, $p=0.002$).

Univariable and Multivariable Analyses of Sexual Behaviours Across Generations

Table 2 presents univariable and multivariable logistic regression models for comparison of sexual behaviours between generations, with Generation X as the reference level. In multivariable models after controlling for self-reported HIV status, sexual identity, ethnicity, and current relationship status, millennials were significantly more likely than Generation Xers to have had anal sex as a bottom (adjusted OR [aOR] = 1.99, 95% CI: 1.33 – 2.97), given another man a blowjob (aOR = 1.86, 95% CI: 1.09 – 3.19), or used sex toys (aOR = 1.67, 95% CI: 1.10 – 2.52) during the six months prior to their first study visit. Millennials also reported less high-risk sex (defined as condomless anal sex with a serodiscordant or unknown HIV-status partner vs. not) during the past six months (OR = 0.61, 95% CI: 0.42 – 0.90); however, this finding was not statistically significant in the multivariable analysis. Baby boomers were less likely than Generation Xers to have had anal sex as a bottom (aOR = 0.57, 95% CI: 0.38 – 0.86) or a top (aOR = 0.42, 95% CI: 0.28 – 0.63), or to have masturbated (aOR = 0.65, 95% CI: 0.44 – 0.98) during the six months prior to their first study visit; they were also less likely to report ever receiving money from escort or sex work (aOR = 0.04, 95% CI: 0.004 – 0.44). The likelihood of engaging in several sexual behaviours, including receiving a blowjob, rimming, fisting, watersports, or having sex at a sex party, darkroom, or blackout event, did not differ across the three generations.

When examining technology use during the six months prior to baseline, baby boomers used smartphone apps (aOR = 0.27, 95% CI: 0.17 – 0.42) and websites (aOR = 0.51, 95% CI: 0.34 – 0.77) to seek sex significantly less than Generation Xers, but used gay telephone chat lines more (aOR = 1.77, 95% CI: 1.09 – 2.87), as opposed to millennials who were significantly less likely to use telephone chat lines (aOR = 0.36, 95% CI: 0.16 – 0.82) but more likely to use smartphone apps (aOR = 1.95, 95% CI: 1.31 – 2.91).

Longitudinal Trends in Sexual Partnering and Relationship Formation Across Generations

At baseline, there were no significant differences in RDS-adjusted prevalence of being partnered across generations with 34.1% of millennials, 37.4% of Generation Xers, and 34.8% of baby boomers reporting a current partner (x^2(*DF*=2, *N*=774)=0.742, *p*=0.690). Over a median follow-up time of 3.4 years, millennials (Odds Ratio [OR] = 1.13, 95% CI: 1.05 – 1.21, per 6-month time period) and Gen Xers (OR = 1.08, 95% CI: 1.02 – 1.14) were increasingly likely to report a regular partner (Figure 1); there was no significant trend observed among baby boomers (OR = 0.99, 95% CI: 0.86 – 1.13).

Likewise, at baseline there were no significant differences between generations in the adjusted median number of male sex partners in the past 6 months, with millennials and Generation X reporting a median of 5 partners and baby boomers reporting 4 partners (*p*=0.70). Over time, all generations reported fewer recent sex partners: millennials (OR = 0.78, 95% CI: 0.74 – 0.84), Generation X (OR = 0.82, 95% CI: 0.80 – 0.86) and baby boomers (OR = 0.68, 95% CI: 0.63 – 0.73) (Figure 2).

Millennials were significantly less likely to report any condomless anal sex with a serodiscordant partner at baseline compared with Generation Xers or baby boomers (27.4% vs. 38.2% vs. 39.7% respectively, *p*=0.025). As seen in Figure 3, over the course of the

study, all three generations were increasingly less likely to report high-risk sex: millennials (OR = 0.94, 95% CI: 0.88 – 0.997), Generation X (OR = 0.95, 95% CI: 0.92 – 0.99), and baby boomers (OR = 0.82, 95% CI: 0.77 – 0.89).

Discussion

In the present study we sought to explore how sexual behaviours varied between baby boomers, Gen Xers, and millennials. Despite our assumptions that, due to the distinct cultural and social environments that these generations experienced, there would be numerous differences between them, our results indicate that the prevalence of the majority of sexual behaviours is similar across all three generations. At baseline, the majority of individuals in each generation reported engaging in oral and anal sex, and on average, reported four to five sex partners over the previous 6 months. Furthermore, while sexual activity with at least one male partner in the past 6 months was an inclusion criterion at baseline, most individuals consistently engaged in sexual activity throughout the study. These findings challenge the common belief that people become less sexually active as they age (Bauer, McAuliffe, & Nay, 2007; Gott, Hinchliff, & Galena, 2004), and provide additional support that many older adults remain sexually active and sex continues to be an important factor in their quality of life (Gott & Hinchliff, 2003; Laumann et al., 2009; Lindau et al., 2007). Additionally, as most baby boomers maintained a highly active sex life, this further emphasizes the need to include older gbMSM in HIV prevention efforts.

Results of multivariable analysis across generations did highlight some differences in sexual behaviours, including less prevalence of masturbation in the baby boomer generation, as well as progressively less bottoming during anal sex across the generations from millennials to baby boomers. Several studies have similarly shown that male masturbation decreases with increasing age, in part due to a decline in physical vitality (Das, 2007; Lindau et al., 2007; Palacios-Ceña et al., 2012). However, it has been suggested that frequency of masturbation is also linked to the cultural norms on masturbation that were prominent during one’s adolescence (Kontula & Haavio-Mannila, 2003). Therefore, the lower rates of masturbation seen in the baby boomer generation is likely a combination of physical aging as well as the negative perception of masturbation that was prevalent before the sexual revolution of the 1960s and 70s (Das, 2007; Kontula & Haavio-Mannila, 2009). Similarly, while decreasing participation in receptive anal intercourse from millennials to Gen Xers to baby boomers may be explained by the effects of aging, it likely also reflects changes in the cultural environment for each subsequent generation of gbMSM, such that behaviours like receptive anal sex which have traditionally faced more stigma, have become more culturally accepted (Wegesin & Mayer-Bahlburg, 2000).

Age at first anal sex with a male partner decreased with each subsequent generation from 20 for baby boomers, 19 for Generation X, and 18 for millennials. This reduction in age likely reflects changes in societal attitudes around anal sex and the progression of LGBTQ rights for each generation. As mentioned, baby boomers were reaching sexual maturity during a time when same-sex behaviour and relationships were illegal. GbMSM who grew up in Generation X likely came out sooner than baby boomers as they were legally allowed to have male sexual partners and to be in same-sex romantic relationships, but they still would

have faced more overt and systemic discrimination than millennials. In Canada, millennials reached adulthood when gay marriage was legalized, indicating a new standard of acceptance. In a movement to respect equal rights, the current Canadian government is close to passing Bill C-75, which will lower the age of consent for anal intercourse from 18 years to match the age of consent for penile-vaginal intercourse at 16 years (Parliament of Canada, 2018). As discrimination towards LGBTQ individuals continues to decrease and gbMSM continue to become more accepted and therefore more comfortable to come out and explore their sexuality at earlier ages, it is likely that the age of first anal sex with a male partner will eventually match the age of first penile-vaginal intercourse which in Canada is 17 years (Maticka-Tyndale, 2001; 2008). Interestingly, age at first oral sex with a male partner was the same in all generations, potentially because there is less stigma or less perceived risk associated with the behaviour (e.g., Fishbein et al., 1993)

The finding that millennials at baseline were less likely than Gen Xers and baby boomers to participate in high-risk sex may contradict the belief that young gbMSM are more complacent about HIV than previous generations (Holloway, Cederbaum, Ajayi, & Shoptaw, 2012; MacKellar et al., 2011; Leonard-Mayers, 2012). This complacency has been suggested to be the result of biomedical advances that mitigate the threat of HIV (Halkitis et al., 2004; Kalichman et al., 2017). Alternatively, it may be more likely that millennials are selecting sexual partners who are similar in age and, given the significantly lower prevalence of HIV among millennials compared to older gbMSM, they therefore have fewer opportunities to engage in sexual activity with HIV-positive partners. As such, condomless anal sex may not be viewed as a high-risk sexual activity. Once HIV status was statistically controlled, there was no longer a significant difference between millennials and the other two generations with respect to engaging in high-risk sexual behaviour, which strengthens this assumption. However, over the course of this study, there was a trend among all generations towards engaging in less high-risk sex. While this may be the result of successful education and prevention campaigns, as well as changes to provincial policy (e.g., Treatment as Prevention), that have occurred in Vancouver, there may also be an effect of differential loss-to-follow-up such that those who remained in the study for the duration of the follow-up period may be engaged in less risky health practices than those who did not. This may also help explain the unexpected trend towards fewer sexual partners given the current context of new technology that has shifted how gbMSM meet and hook up. Traditional venues for gbMSM to meet sex partners, such as gay bars, have largely been replaced by the Internet and smartphone applications (Zablotska, Holt, & Prestage, 2012). Despite the consensus that technology has made it easier to find a sexual partner (McKie, Lachowsky & Milhausen, 2015), our findings do not necessarily support the idea that technology has led gbMSM to be more sexually active (Lehmiller & Ioerger, 2014). Finally, there was a trend towards an increase in regular partnering, as both millennials and Gen Xers were more likely to report a current partner by the end of the study. While partnering is typically associated with increased age, two generations showing this trend and the null finding of no differences between generations at baseline suggests the influence of another factor, which may be the shift towards great cultural acceptance of gbMSM relationships.

There are strengths and limitations of the present study. The generalizability of our findings was restricted by the eligibility requirement of reporting sex with another man in the past 6

months. This prevents the results from being generalizable to all male sexual minority individuals as those who had not had sex with a man in the past 6 months were ineligible to participate. However, data were collected from an RDS-recruited sample of gay, bisexual, and other men who have sex with men which notably reaches participants who would otherwise be missed in traditional recruitment strategies such as enlisting from HIV clinics or sampling at gay venues (e.g., Kendall et al., 2008). Furthermore, it allows for the calculation of more representative population parameter estimates. A limitation of this study is the inability to isolate the effects of aging from generational effects. A more complex longitudinal design is required to untangle which results are due to which effects, and therefore should be employed in further studies. Additionally, we are unable to determine if participants who were lost to follow up have different sexual and partnering behaviours than those who remained in the study. Finally, as the data are self-reported they are vulnerable to recall and social desirability biases; although these are mitigated by the shortened past 6 month recall period and the longitudinal nature of the study.

Despite these limitations, our findings show that while there were some differences in sexual behaviours between the three generations, the similarities were more striking, with older gbMSM reporting comparable sexual behaviours and partner numbers as younger gbMSM. Furthermore, participants trended toward less high-risk sex, fewer partners, and regular partnering in spite of, or perhaps because of, changes in cultural context and advances in HIV prevention techniques. These results emphasize the importance of including all gbMSM in HIV education and prevention campaigns, and suggests that older gbMSM are still active members of their sexual communities.

Acknowledgements

The authors would like to thank the Momentum Health Study participants, office staff and community advisory board, as well as our community partner agencies, Health Initiative for Men, YouthCO HIV & Hep C Society, and Positive Living Society of BC. Momentum is funded through the National Institute on Drug Abuse (R01DA031055–01A1) and the Canadian Institutes for Health Research (MOP-107544, FDN-143342, PJT-153139). NJL was supported by a CANFAR/CTN Postdoctoral Fellowship Award. DMM and NJL are supported by Scholar Awards from the Michael Smith Foundation for Health Research (#5209, #16863). HLA was supported by a Postdoctoral Fellowship Award from the Canadian Institutes of Health Research (Grant # MFE-152443). KGC is supported by a Canadian HIV Trials Network / Canadian Foundation for AIDS Research Postdoctoral Fellowship award, a Michael Smith Foundation for Health Research Trainee award, and a Canadian Institutes of Health Research Health Systems Impact Fellowship award.

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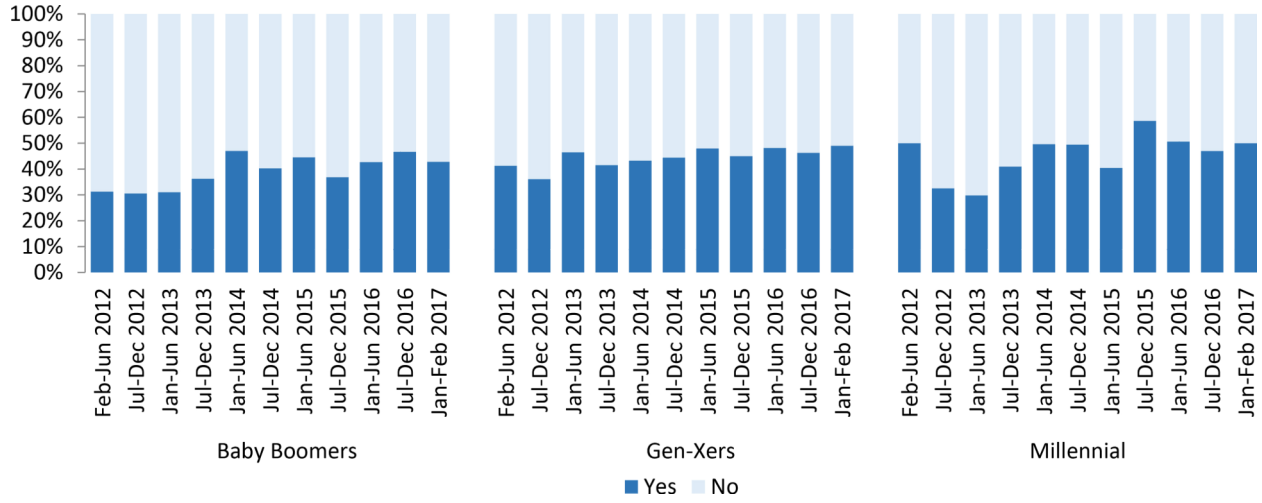

Figure 1.
Trends in current regular partner

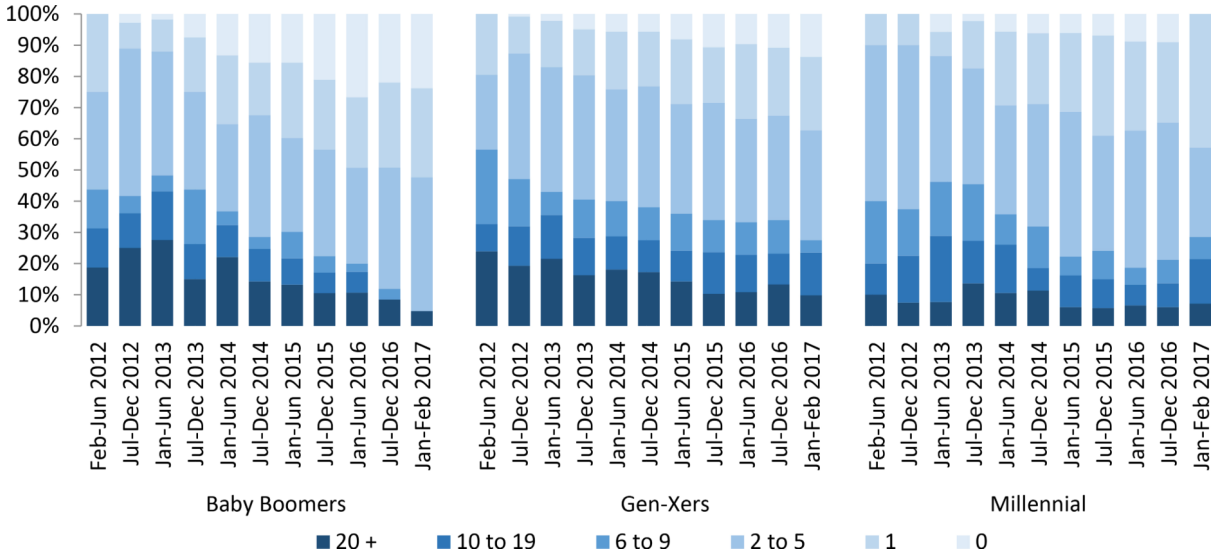

Figure 2.
Trends in number of male sex partners reported during the past six months

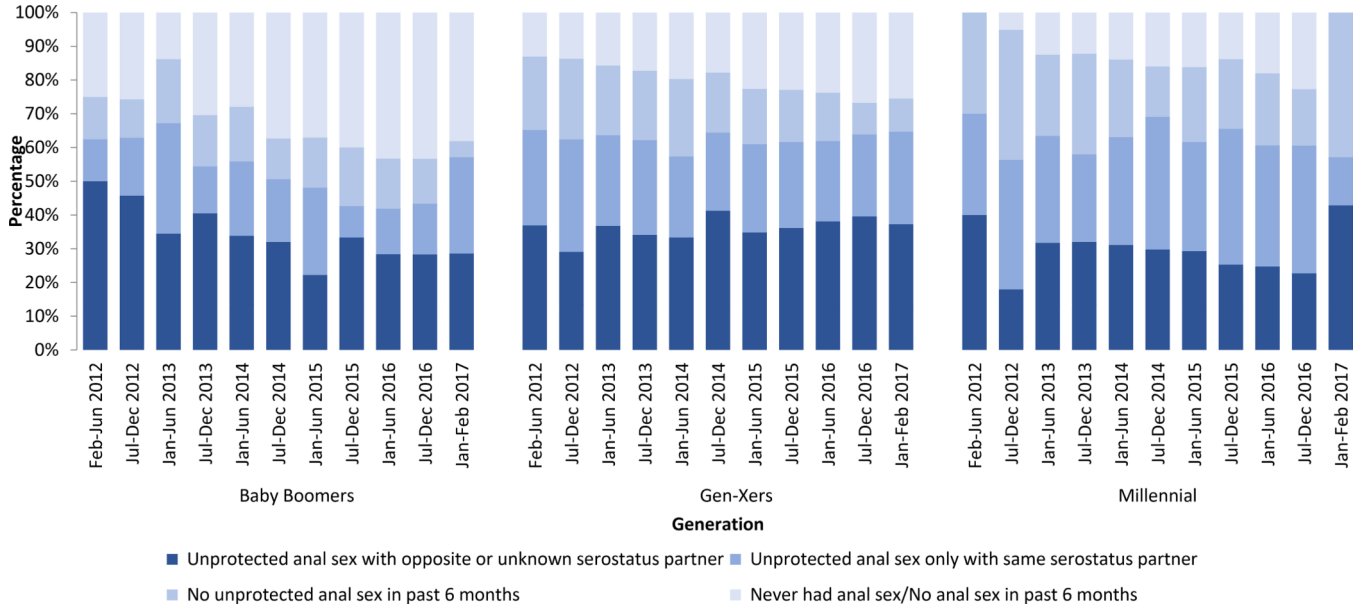

Figure 3.
Trends in high-risk sex during the past six months

Table 1.

Crude and respondent-driven sampling (RDS) sample descriptive statistics

	Overall Sample (N = 744)		Baby Boomers (N = 115)		Generation X (N = 469)		Millennials (N = 190)		
Categorical Variable	n (%)	RDS % (95% CI)	n (%)	RDS % (95% CI)	n (%)	RDS % (95% CI)	n (%)	RDS % (95% CI)	p-value *
Sexual Orientation									0.150
Gay Identified	655 (84.6)	79.9 (75.7 – 84.7)	99 (86.1)	79.8 (67.6 – 92.1)	403 (85.9)	84.2 (79.2 – 89.1)	153 (80.5)	78.1 (70.0 – 86.2)	
Other/Bisexual	119 (15.4)	20.1 (15.3 – 24.3)	16 (13.9)	20.2 (7.9 – 32.4)	66 (14.1)	15.8 (10.9 – 20.8)	37 (19.5)	21.9 (13.8 – 30.0)	
Ethnicity									0.018
White	585 (75.6)	68.7 (61.9 – 74.7)	100 (87.0)	79.0 (65.8 – 92.1)	341 (72.7)	66.6 (60.1 – 73.1)	144 (75.8)	71.1 (61.3 – 80.9)	
Non-White	189 (24.4)	31.3 (25.3 – 38.1)	15 (13.0)	21.0 (7.9 – 34.2)	128 (27.3)	33.4 (26.9 – 39.9)	46 (24.2)	28.9 (19.1 – 38.7)	
Self-reported HIV Status									<0.001
Negative/Unknown	554 (71.6)	78.6 (71.3–85.5)	51 (44.3)	46.6 (33.0 – 60.3)	316 (67.4)	69.2 (63.2 – 75.2)	187 (98.4)	98.8 (97.0 – 100.0)	
Positive	220 (28.4)	21.4 (14.5 – 28.7)	64 (55.7)	53.4 (39.7 – 67.0)	153 (32.6)	30.8 (24.8 – 36.8)	3 (1.6)	1.2 (0.0 – 3.0)	
Current Partner									0.690
No	477 (61.6)	62.4 (56.3 – 68.3)	72 (62.6)	65.2 (52.7 – 77.6)	278 (59.3)	62.6 (56.4 – 68.8)	127 (66.8)	65.9 (56.5 – 75.3)	
Yes	297 (38.4)	37.6 (31.7 – 43.7)	43 (37.4)	34.8 (24.9 – 49.7)	191 (40.7)	37.4 (31.2 – 43.6)	63 (33.2)	34.1 (24.7 – 43.5)	
Anal Sex Preference									0.001
Bottom	258 (33.3)	32.1 (27.0 – 37.8)	38 (33.0)	37.9 (24.1 – 51.6)	140 (29.9)	27.4 (21.8 – 33.0)	80 (42.1)	40.3 (30.4 – 50.1)	
Versatile	210 (27.1)	26.6 (21.1 – 31.9)	26 (22.6)	15.7 (6.5 – 24.8)	136 (29.0)	28.2 (22.4 – 34.0)	48 (25.3)	26.9 (17.6 – 36.2)	
Top	272 (35.1)	34.7 (29.4 – 39.7)	46 (40.0)	37.3 (24.9 – 49.7)	169 (36.0)	37.7 (31.3 – 44.2)	57 (30.0)	30.0 (21.2 – 38.7)	
Prefer no anal	34 (4.4)	6.6 (3.3 – 11.3)	5 (4.3)	9.2 (0.0 – 19.2)	24 (5.1)	6.7 (2.9 – 10.4)	5 (2.6)	2.9 (0.1 – 5.6)	
High-risk Sex, P6M									<0.001
No anal sex	97 (12.8)	15.6 (11.3 – 21.0)	22 (19.5)	25.7 (13.1 – 38.3)	58 (12.7)	14.1 (9.3 – 18.9)	17 (9.1)	9.0 (4.2 – 13.9)	
No CAS	171 (22.6)	23.2 (18.6 – 29.5)	18 (15.9)	13.5 (4.5 – 22.5)	97 (21.3)	22.4 (16.7 – 28.1)	56 (29.9)	33.8 (23.8 – 43.9)	
CAS same HIV-status partner	197 (26.1)	24.9 (19.7 – 29.8)	22 (19.5)	21.1 (9.6 – 32.6)	121 (26.5)	25.2 (19.8 – 30.7)	54 (28.9)	29.7 (20.7 – 38.8)	
CAS other/unknown HIV-status partner	291 (38.5)	36.3 (29.6 – 42.0)	51 (45.1)	39.7 (26.4 – 53.1)	180 (39.5)	38.2 (31.8 – 44.6)	60 (32.1)	27.4 (18.6 – 36.2)	
Anal sex as bottom, P6M									0.001
No	250 (32.3)	37.6 (31.8 – 43.8)	48 (41.7)	47.5 (33.8 – 61.1)	155 (33.0)	37.0 (20.5 – 43.4)	47 (24.7)	27.6 (19.0 – 36.2)	
Yes	524 (67.7)	62.4 (56.2 – 68.2)	67 (58.3)	52.5 (38.9 – 66.2)	314 (67.0)	63.0 (56.6 – 69.5)	143 (75.3)	72.4 (63.8 – 81.0)	
Anal sex as top, P6M									<0.001

No	221 (28.6)	35.1 (29.5 – 41.6)	44 (38.3)	50.3 (3.6 – 63.9)	127 (27.1)	28.6 (22.6 – 34.6)	50 (26.3)	33.1 (23.2 – 43.1)	
Yes	553 (71.4)	64.9 (58.4 – 70.5)	71 (61.7)	49.7 (36.1 – 63.4)	342 (72.9)	71.4 (65.4 – 77.4)	140 (73.7)	66.9 (56.9 – 76.8)	
Blowjob from man, P6M									0.006
No	108 (14.0)	20.3 (15.3 – 26.0)	21 (18.3)	25.7 (12.4 – 39.1)	70 (14.9)	19.7 (14.2 – 25.2)	17 (8.9)	11.8 (4.3 – 19.3)	
Yes	666 (86.0)	79.7 (74.0 – 84.7)	94 (81.7)	74.3 (60.9 – 87.6)	399 (85.1)	80.3 (74.8 – 85.8)	173 (91.1)	88.2 (80.7 – 95.7)	
Gave man blowjob, P6M									0.005
No	105 (13.6)	20.9 (16.1 – 26.5)	19 (16.5)	26.0 (12.7 – 39.4)	68 (14.5)	19.1 (13.8 – 24.3)	18 (9.5)	11.9 (5.0 – 18.8)	
Yes	669 (86.4)	79.1 (73.5 – 83.9)	96 (83.5)	74.0 (60.6 – 87.3)	401 (85.5)	80.9 (75.7 – 86.2)	172 (90.5)	88.1 (81.2 – 95.0)	
Rimming, P6M									0.336
No	301 (38.9)	51.3 (45.0 – 58.0)	49 (42.6)	50.6 (37.0 – 64.3)	184 (39.2)	48.1 (41.5 – 54.7)	68 (35.8)	42.8 (32.8 – 52.8)	
Yes	473 (61.1)	48.7 (42.0 – 55.0)	66 (57.4)	49.4 (35.7 – 63.0)	285 (60.8)	51.9 (45.3 – 58.5)	122 (64.2)	57.2 (47.2 – 67.2)	
Masturbation, P6M									0.001
No	190 (24.5)	33.1 (27.6 – 39.8)	48 (41.7)	41.1 (27.6 – 54.7)	113 (24.1)	30.1 (239 – 36.4)	29 (15.3)	21.9 (12.7 – 31.0)	
Yes	584 (75.5)	66.9 (60.2 – 72.4)	67 (58.3)	58.9 (45.3 – 72.4)	356 (75.9)	69.9 (63.6 – 76.1)	161 (84.7)	78.1 (69.0 – 87.3)	
Fisting, P6M									0.068
No	693 (89.5)	93.0 (90.4 – 95.4)	98 (85.2)	88.1 (81.3 – 94.8)	420 (89.6)	93.9 (91.9 – 96.0)	175 (92.1)	92.3 (86.3 – 98.3)	
Yes	81 (10.5)	7.0 (4.6 – 9.6)	17 (14.8)	11.9 (5.2 – 18.7)	49 (10.4)	6.1 (4.0 – 8.1)	15 (7.9)	7.7 (1.7 – 13.7)	
Used sex toys, P6M									0.095
No	556 (71.8)	75.6 (70.5 – 80.6)	79 (68.7)	74.9 (64.3 – 85.5)	336 (71.6)	78.1 (73.4 – 82.8)	141 (74.2)	69.9 (59.6 – 80.2)	
Yes	218 (28.2)	24.4 (19.4 – 29.5)	36 (31.3)	25.1 (14.5 – 35.7)	133 (28.4)	21.9 (17.2 – 26.6)	49 (25.8)	30.1 (19.8 – 40.4)	
Watersports, P6M									0.378
No	666 (86.0)	91.8 (88.7 – 94.4)	101 (87.8)	91.0 (83.2 – 98.7)	400 (85.3)	89.7 (86.3 – 93.1)	165 (86.8)	93.3 (90.0 – 96.5)	
Yes	108 (14.0)	8.2 (5.6 – 11.3)	14 (12.2)	9.0 (1.3 – 16.8)	69 (14.7)	10.3 (6.9 – 13.7)	25 (13.2)	6.7 (3.5 – 10.0)	
Other sexual activities, P6M									0.095
No	726 (93.8)	95.3 (92.8 – 97.4)	109 (94.8)	95.7 (91.3 – 100.0)	440 (93.8)	96.3 (94.7 – 98.0)	177 (93.2)	92.3 (86.3 – 98.3)	
Yes	48 (6.2)	4.7 (2.6 – 7.2)	6 (5.2)	4.3 (0.0 – 8.7)	29 (6.2)	3.7 (2.0 – 5.3)	13 (6.8)	7.7 (1.7 – 13.7)	
Had sex at a sex party/darkroom/blackout event, P6M									0.474
No	575 (74.3)	78.5 (74.0 – 83.8)	83 (72.2)	74.9 (63.6 – 86.4)	338 (72.1)	77.1 (71.8 – 82.3)	154 (81.1)	80.5 (71.8 –89.2)	
Yes	199 (25.7)	21.5 (16.2 – 26.0)	32 (27.8)	25.1 (13.6 – 36.5)	131 (27.9)	22.9 (17.7 – 28.2)	36 (18.9)	19.5 (10.8 – 28.2)	
Smartphone apps to seek sex, P6M									<0.001
No	353 (45.6)	54.6 (47.7 – 61.7)	85 (73.9)	78.5 (68.6 – 88.5)	211 (45.0)	48.8 (42.2 – 55.3)	57 (30.0)	31.4 (21.9 – 40.9)	
Yes	421 (54.4)	45.4 (38.3 – 52.3)	30 (26.1)	21.5 (11.5 – 31.4)	258 (55.0)	51.2 (44.7 – 57.8)	133 (70.0)	68.6 (59.1 – 78.1)	

Gay telephone chat lines to seek sex, P6M									<0.001
No	671 (86.7)	84.2 (79.6 – 88.3)	87 (75.7)	74.0 (61.6 – 86.5)	400 (85.3)	86.6 (82.3 – 90.9)	184 (96.8)	95.8 (91.8 – 99.8)	
Yes	103 (13.3)	15.8 (11.7 – 20.4)	28 (24.3)	26.0 (13.5 – 38.4)	69 (14.7)	13.4 (9.1 – 17.7)	6 (3.2)	4.2 (0.2 – 8.2)	
Internet hook-up sites or other websites to seek sex, P6M									0.007
No	286 (37.0)	42.6 (37.1 – 49.7)	44 (38.3)	52.8 (39.3 – 66.2)	166 (35.4)	38.3 (31.8 – 44.7)	76 (40.0)	38.8 (29.3 – 48.3)	
Yes	488 (63.0)	57.4 (50.3 – 62.9)	71 (61.7)	47.2 (33.8 – 60.7)	303 (64.6)	61.7 (55.3 – 68.2)	114 (60.0)	61.2 (51.7 – 70.7)	
Given money/drugs/goods/services in exchange for sex									0.041
No	624 (80.6)	74.3 (68.7 – 79.8)	81 (70.4)	69.7 (56.8 – 82.5)	373 (79.3)	76.8 (70.9 – 82.7)	171 (90.0)	81.7 (72.4 – 91.0)	
Yes	150 (19.4)	25.7 (20.2 – 31.3)	34 (29.6)	30.3 (17.5 – 43.2)	97 (20.7)	23.2 (17.3 – 29.1)	19 (10.0)	18.3 (9.0 – 27.6)	
Received any money/drugs/goods/services in exchange for sex									0.800
No	529 (68.4)	66.8 (61.1 – 73.2)	82 (71.3)	69.4 (56.1 – 82.7)	312 (66.7)	67.3 (61.0 – 73.5)	135 (71.1)	65.9 (55.9 – 75.9)	
Yes	244 (31.6)	33.2 (26.8 – 38.9)	33 (28.7)	30.6 (17.3 – 43.9)	156 (33.3)	32.7 (26.5 – 39.0)	55 (28.9)	34.1 (24.1 – 44.1)	
Worked as an escort or in the sex industry									0.005
No	632 (81.7)	80.3 (75.1 – 84.8)	97 (84.3)	88.8 (80.5 – 97.1)	371 (79.1)	77.2 (714 – 83.1)	164 (86.3)	84.0 (76.1 – 92.0)	
Yes	142 (18.3)	19.7 (15.2 – 24.9)	18 (15.7)	11.2 (2.9 – 19.5)	98 (20.9)	22.8 (16.9 – 28.6)	26 (13.7)	16.0 (8.0 – 23.9)	

	Overall Sample (N = 744)	Baby Boomers (N = 115)		Generation X (N = 469)		Millennials (N = 190)		
Continuous Variable	M (Q1 - Q3)	M (Q1 - Q3)	aM (aQ1 - aQ3)	M (Q1 - Q3)	aM (aQ1 - aQ3)	M (Q1 - Q3)	aM (aQ1 - aQ3)	
Age at interview date	34 (26 – 47)	55 (53 – 60)	55 (53 – 60)	36 (30 – 44)	36 (30 – 43)	23 (21 – 24)	23 (21 – 24)	<0.001
Age at first oral sex with male	16 (13 – 19)	15 (12 – 18)	17 (13 – 20)	16 (13 – 19)	16 (12 – 19)	16 (14 – 19)	16 (14 – 18)	0.369
Age at first anal sex with male	18 (16 – 21)	19 (16 – 24)	20 (17 – 25)	19 (16 – 22)	19 (16 – 22)	18 (16 – 20)	18 (16 – 20)	0.002
# of males had sex with, P6M	5 (2 – 14)	5 (2 – 15)	4 (1 – 12)	5 (3 – 15)	5 (2 – 12)	5 (3 – 10)	5 (2 – 10)	0.704
# of males had anal sex with, P6M	3 (1 – 8)	4 (1 – 10)	2 (0 – 8)	3 (1 – 9)	3 (1 – 8)	3 (2 – 7)	3 (2 – 7)	0.955
# of female sex partners, P6M	0 (0 – 0)	0 (0 – 0)	0 (0 – 0)	0 (0 – 0)	0 (0 – 0)	0 (0 – 0)	0 (0 – 0)	0.004

Note. P6M = past 6 months; M = median; Q1 = first quartile; Q3 = third quartile; aM = adjusted median, aQ1 = adjusted first quartile, aQ3 = adjusted third quartile; CAS = condomless anal sex

*p-values were calculated by weighted Chi-square or Fisher's Exact tests (categorical) and by Kruskal-Wallis tests (continuous)

Table 2.

Univariable and multivariable analysis results for sexual behaviours between generations

	Univariable		Multivariable	
	Baby Boomers vs Generation X	Millennials vs Generation X	Baby Boomers vs Generation X	Millennials vs Generation X
Categorical outcome	OR (95% CI)	OR (95% CI)	aOR (95% CI)	aOR (95% CI)
Sexual Orientation				
Gay Identified	Ref.	Ref.	Ref.	Ref.
Other/Bisexual	1.35 (0.83 – 2.18)	1.5 (0.97 – 2.31)	1.36 (0.83 – 2.24)	1.49 (0.95 – 2.36)
Ethnicity				
White	Ref.	Ref.	Ref.	Ref.
Non-White	**0.53 (0.34 – 0.83)**	0.81 (0.56 – 1.18)	**0.53 (0.33 – 0.84)**	0.79 (0.53 – 1.17)
Self-reported HIV Status				
Negative/Unknown	Ref.	Ref.	Ref.	Ref.
Positive	**2.57 (1.75 – 3.79)**	**0.03 (0.01 – 0.11)**	**2.55 (1.73 – 3.77)**	**0.03 (0.01 – 0.11)**
Current Partner				
Yes	Ref.	Ref.	Ref.	Ref,
No	1.12 (0.75 – 1.66)	1.16 (0.80 – 1.66)	1.10 (0.73 – 1.65)	1.21 (0.83 – 1.77)
Anal Sex Preference				
Bottom	Ref.	Ref.	Ref.	Ref.
Versatile	**0.40 (0.23 – 0.70)**	0.65 (0.42 –1.01)	**0.41 (0.23 – 0.72)**	0.64 (0.40 – 1.03)
Top	0.72 (0.46 – 1.12)	**0.54 (0.35 – 0.83)**	0.89 (0.55 – 1.42)	**0.41 (0.26 – 0.64)**
Prefer no anal	1.00 (0.48 – 2.06)	**0.29 (0.11 – 0.78)**	0.90 (0.42 – 1.91)	**0.28 (0.10 – 0.79)**
High-risk Sex (yes vs. no), P6M	1.07 (0.72 – 1.58)	**0.61 (0.42 – 0.90)**	1.01 (0.67 – 1.52)	0.72 (0.48 – 1.08)
Anal sex as bottom, P6M	**0.65 (0.44 – 0.95)**	**1.54 (1.05 – 2.25)**	**0.57 (0.38 – 0.86)**	**1.99 (1.33 – 2.97)**
Anal sex as top, P6M	**0.40 (0.27 – 0.58)**	0.81 (0.56 – 1.17)	**0.42 (0.28 – 0.63)**	0.84 (0.57 – 1.24)
Blowjob from man, P6M	0.71 (0.45 – 1.10)	**1.84 (1.10 – 3.06)**	0.88 (0.56 – 1.39)	1.54 (0.90 – 2.65)
Gave man blowjob, P6M	0.67 (0.43 – 1.04)	**1.74 (1.05 – 2.90)**	0.71 (0.44 – 1.12)	**1.86 (1.09 – 3.19)**
Rimming, P6M	0.90 (0.62 – 1.32)	1.24 (0.87 – 1.76)	0.91 (0.61 – 1.34)	1.30 (0.90 – 1.88)
Masturbation, P6M	**0.62 (0.42 – 0.91)**	**1.54 (1.02 – 2.32)**	**0.65 (0.44 – 0.98)**	1.43 (0.94 – 2.20)
Fisting, P6M	**2.10 (1.11 – 3.98)**	1.30 (0.66 – 2.54)	1.91 (0.99 – 3.71)	1.45 (0.71 – 2.96)
Used sex toys, P6M	1.20 (0.77 –1.86)	**1.54 (1.04 – 2.27)**	1.14 (0.72 – 1.80)	**1.67 (1.10 – 2.52)**
Other sexual activities, P6M	1.18 (0.46 – 3.06)	**2.20 (1.05 – 4.59)**	1.07 (0.40 – 2.83)	2.12 (0.96 – 4.65)
Sex at a sex party/darkroom/ blackout event, P6M	1.13 (0.73 – 1.75)	0.81 (0.53 –1.25)	1.08 (0.69 – 1.71)	0.93 (0.59 – 1.47)
Gay telephone chat lines to seek sex, P6M	**2.27 (1.43 – 3.61)**	**0.28 (0.13 – 0.62)**	**1.77 (1.09 – 2.87)**	**0.36 (0.16 – 0.82)**
Phone apps to seek sex, P6M	**0.26 (0.17 – 0.41)**	**2.08 (1.44 – 3.00)**	**0.27 (0.17 – 0.42)**	**1.95 (1.31 – 2.91)**
Internet hook-up sites or other websites to seek sex, P6M	**0.56 (0.38 – 0.81)**	0.98 (0.69 – 1.40)	**0.51 (0.34 – 0.77)**	1.09 (0.75 – 1.59)
Given money, drugs, or goods in exchange for sex	1.44 (0.95 – 2.20)	0.74 (0.48 – 1.15)	1.23 (0.79 – 1.92)	0.88 (0.55 – 1.41)

Received money, drugs or goods in exchange for sex	0.90 (0.60 – 1.36)	1.06 (0.74 – 1.53)	0.70 (0.46 – 1.09)	1.38 (0.93 – 2.05)
Worked as an escort or in the sex industry	**0.43 (0.24 – 0.76)**	0.65 (0.41 – 1.02)	**0.29 (0.16 – 0.53)**	0.98 (0.59 – 1.62)

	Univariable		Multivariable	
	Baby Boomers vs Generation X	Millennials vs Generation X	Baby Boomers vs Generation X	Millennials vs Generation X
Continuous Outcome	Coef (95% CI)	Coef (95% CI)	aCoef (95% CI)	aCoef (95% CI)
# of males had sex with, P6M	−1.81 (−8.60 – 4.99)	−5.46 (−11.69 – 0.77)	−2.67 (−9.57 – 4.24)	−4.94 (−11.39 – 1.51)
# of males had anal sex with, P6M	−2.72 (−6.30 – 0.85)	−2.10 (−5.38 – 1.18)	**−3.96 (−7.55 – −0.37)**	−0.52 (−3.87 – 2.83)
# of female sex partners, P6M	−0.16 (−0.32 – 0.01)	**0.21 (0.05 – 0.36)**	**−0.19 (−0.34 – −0.40)**	0.12 (−0.02 – 0.26)

Note. Data with bold emphasis indicates statistical significance at P < 0.05. P6M = Past 6 months; aOR = adjusted odds ratio; CI = confidence interval.

Multivariable models are adjusted for self-reported HIV status, sexual identity, ethnicity, and current relationship status.