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Impact of Age of Sexual Debut on HIV Care Engagement among Sexual and Gender Minorities in Nigeria

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Abstract

Background: Sexual and gender minorities (SGM) bear a high burden of HIV. The age of anal sexual debut may influence HIV care engagement. Our objective was to evaluate this relationship to help healthcare providers promote and anticipate future HIV care engagement among at-risk SGM.

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Methods: The TRUST/RV368 study provided HIV testing and treatment at SGM-friendly clinics in Abuja and Lagos, Nigeria. Self-reported age of sexual debut was dichotomized as <16 or ≥16 years. Multivariable logistic models estimated adjusted odds ratios (aOR) and 95% confidence intervals (CI) for the association of sexual debut with 1) prior HIV testing history, 2) HIV testing at the clinics, 3) initiation of antiretroviral therapy (ART) within 6 months of a clinic diagnosis, 4) viral suppression within 12 months of ART initiation.

Results: Of the 2,680 participants, 30% (n=805) reported a sexual debut <16 years. Those with an <16-year debut had significantly more receptive sex partners, condomless sex, and transactional sex (all $p<0.01$) and were 24% less likely to have tested for HIV before enrollment (aOR: 0.76; CI: 0.62–0.93). However, <16-year debut was not associated with HIV testing, receiving ART or achieving viral suppression once engaged with TRUST/RV368 (all $p>0.05$).

Conclusions: SGM with <16-year debut engaged in behaviors that could increase HIV risk and were less likely to have a history of HIV testing. However, once enrolled in SGM-friendly clinics, uptake of HIV care was not associated with <16-year debut, suggesting that SGM-friendly care models may promote HIV care engagement.

INTRODUCTION

The World Health Organization recognizes HIV as a leading cause of death in countries across Africa, where more than 67% of persons living with HIV globally reside.¹ Globally, sexual and gender minorities (SGM), including transgender women, are 28 times more likely to be living with HIV as compared to non-SGM populations.^{2–8} Additional attention is warranted in Nigeria where there has been a consistently high prevalence of HIV among SGM.^{2,3} Identifying early predictors and risk factors associated with HIV among Nigerian SGM may help prevent HIV transmission and improve HIV care engagement, benefiting a historically vulnerable population.

Social and structural factors have been shown to exacerbate HIV vulnerabilities.⁴ Although individual-level risk factors may be solely insufficient to address the high burden of HIV,⁵ examination of such factors is vital to guide appropriate public health interventions at the macro level.⁴ One less studied individual-level factor is age of anal sexual debut, a potential predecessor of many of the established risk factors for acquiring HIV.⁶ Notably, age of anal sexual debut has been seen to occur younger in SGM compared to non-SGM⁷ with additional research suggesting a decreasing debut age for SGM over time.^{8,9} Younger age of sexual debut has also been associated with condomless sex, substance abuse, poor mental health, and decreased educational attainment which independently may increase risk of HIV acquisition.^{7,10,11,12} Of note, a multisite study of young SGM performed in the United States found persons with younger age of sexual debut were more likely to engage in transactional sex, have emotional and psychological problems from drug use, and attempt suicide compared to those with a sexual debut of 16 years or older.¹³ Moreover, depression, another potential risk factor for HIV,^{14,15} has been positively linked to younger age of sexual debut among adolescent populations.^{16–18} The variety of factors associated with age of sexual debut indicates that younger debut may serve as an important determinant in addressing an individual's risk for HIV and their engagement in care.

Literature on the connection between a younger age of sexual debut and HIV acquisition among vulnerable populations is sparse. However, studies have found a younger age of sexual debut to be associated with a higher prevalence of HIV among youth between 15–24 years of age¹⁹ and an increased risk for new cases of HIV for sexually active women.²⁰ Other studies specific to SGM have found that younger age of sexual debut can lead to an earlier age of HIV acquisition.^{7,10,11} Furthermore, individuals who begin having sex at a younger age accumulate more time at risk for sexually-transmitted HIV.^{8,13} Identifying the relationship between the age of sexual debut and HIV care engagement among SGM may help healthcare providers anticipate future engagement among at-risk SGM and assist in designing interventions to promote and maintain care.

A cross-sectional multi-country African study of 23,000 young adults found that those with an earlier age of sexual debut were less likely to seek HIV testing.²¹ In low- to middle-income settings, stigma surrounding same-sex practices or LGBTQ+ identities may further discourage young SGM from HIV testing and engagement with the care continuum.^{22–26} SGM-friendly clinics are of particular interest as they are designed to overcome barriers related to stigma and fear that may prevent individuals from seeking routine care.²⁷ Data indicates positive outcomes from these clinics,^{27–29} and we aim to assess whether younger age of sexual debut impacts engagement within this supportive environment. Therefore, our objective was to quantify the association between younger age of anal sexual debut and HIV care before and after engaging with our SGM-friendly clinics, specifically examining past HIV testing before our SGM-friendly clinics, current HIV testing, initiation of antiretroviral therapy (ART) within six months, and viral suppression by 12 months at our SGM-friendly clinics.

METHODS

Study design and sample population

We utilized data from the TRUST/RV368 HIV prevention and treatment cohort study in Abuja and Lagos, Nigeria. In the parent cohort, participants were recruited through respondent driven sampling as previously described.^{30–32} Participants were eligible if they were assigned male sex at birth, aged 16 years or older in Abuja or 18 years or older in Lagos, reported anal sex with a male partner in the past year, and provided informed consent in Hausa or English. Differences in age eligibility at the two sites was defined by the local Institutional Review Boards. Although our study population was predominantly cisgender men, it also included transgender women and non-binary/other gender identities.³³ Therefore, the use of SGM in this paper refers to cisgender sexual minority men, transgender women, and non-binary people.

Participants completed clinical evaluations and a structured survey instrument. Based on national guidelines, HIV laboratory testing was done at enrollment and each subsequent quarterly visit for anyone who was not living with HIV.^{34–35} ART was provided for anyone who was diagnosed with HIV and HIV viral loads were quantified every three months in Abuja and every six months in Lagos using COBAS TaqMan (Roche Molecular Diagnostics, CA). Any person who did not report their age of sexual debut or were virally suppressed at enrollment were excluded from the analytic sample.

Ethical considerations

Unique study identifiers for all participants who provided informed consent were used to de-identify the study data and analyses. Institutional review boards at the Nigerian Federal Capital Territory Health Research Ethics Committee, the Nigerian Ministry of Defense in Nigeria, the University of Maryland Baltimore, and the Walter Reed Army Institute of Research reviewed and approved the research protocol.

Data measures

The main exposure of interest was age at sexual debut, captured by responses to the questionnaire item “Approximately how old were you the first time you had anal sex with another man?”. Participants’ reported age of sexual debut was dichotomized as <16 and ≥16 years of age as determined in prior literature.^{36,37}

The four HIV care engagement outcomes were: (1) self-reported HIV testing before TRUST/RV368 (lifetime measure; dichotomized as yes or no), (2) laboratory testing of HIV either at enrollment or during follow-up in TRUST/RV368 (dichotomized as negative or positive), (3) receipt of ARTs within six months of laboratory diagnosis at TRUST/RV368 (dichotomized as yes or no), and (4) viral suppression within 12 months of laboratory diagnosis at TRUST/RV368 (dichotomized as <20 and ≥20 copies/mL). For persons testing HIV positive at enrollment, the enrollment visit defined the start of the observation period for the six-month engagement with ART and 12-month viral load suppression. For persons who seroconverted later in follow-up, the visit when they were diagnosed with HIV was used as the start time for defining their window until ART uptake and viral suppression.

Participant-level factors of interest included demographic characteristics such as age (categorized into three groups: 16–19, 20–24, or 25+), education (up to and including senior secondary or more than senior secondary), gender identity (cisgender man, transgender woman, or non-binary/other), sexual orientation (homosexual, bisexual, or other), number of receptive male sex partners in year prior to enrollment (0–2 or 3+), exchanged sex for something in the year prior to enrollment (no or yes), ever engaged in condomless anal sex (no or yes), ever been forced to have sex (no or yes), disclosure to family of having sex or being attracted to other men (no or yes), and exposure to HIV health information (no, yes, or unknown) by participating in any talks or meetings related to HIV/AIDS within the year prior to enrollment.

Depression was measured using the Patient Health Questionnaire (PHQ-9) which is a set of questions used to identify depressive symptoms.³⁸ Participants’ responses to depression were categorized as minimal depression (score of ≤4), moderate to severe depression (score of 5+), or unknown based upon validated scoring and data availability.³⁸ Additionally, a latent class analysis was performed using a set of nine questions pertaining to participants’ experiences related to sexual stigma.³⁹ These nine questions referred to incidences that involved family, friends, police, verbal harassment, blackmail, violence, rape, fear of seeking healthcare, and fear of walking in public that were related to sexual stigma prevalent in both Western and Southern Africa and validated as associated with adverse health outcomes.^{26,40} The responses were then categorized into low, moderate, or high sexual stigma groups.

Statistical analyses

Pearson's chi-squared tests were used to compare demographic characteristics and behavioral risk factors of participants based on their self-reported age of sexual debut. Logistic regression models were used to estimate unadjusted and adjusted odds ratios (aORs) and 95% confidence intervals (CIs) for the associations between anal sexual debut and each of the four HIV care engagement outcomes. Factors independently associated with the exposure and the outcome, *a priori* identified in the literature, and found to alter the Beta estimate by more than 10% were evaluated as potential confounders. All confounders were added to the model and beginning with the least significant, factors were removed sequentially if they did not significantly confound the main association to obtain the most parsimonious model. For all analyses, a two-sided type I error of 5% was considered for statistical significance. All data analyses were performed using Stata 17.0 (StataCorp LP, College Station, TX, USA).

RESULTS

Between March 2013 and February 2020, 99.7% of participants (2,787/2,795) enrolled in the TRUST/RV368 cohort reported their age of sexual debut (median age: 17 years; interquartile range [IQR]: 16–21). One hundred and seven participants were subsequently excluded from the analytic sample because they were virally suppressed at enrollment, resulting in a final sample size of 2,680. The median age at enrollment was 24 years (IQR: 20–27), and 40.3% of our sample was living with HIV (1,079/2,680). Among participants living with HIV, 86.4% tested positive at enrollment (933/1,079), and 13.5% seroconverted during follow-up (146/1,079). The prevalence of <16-year sexual debut was 30.0% (n=805/2,680). A significantly higher proportion of those with a <16-year sexual debut reported having more receptive sex partners (≥ 3 in the past year: 55.5% vs. 36.6%, $p<0.01$), engaging in condomless anal sex (89.5% vs. 80.5%, $p<0.01$), and participating in transactional sex (51.3% vs. 40.0%, $p<0.01$) compared to those with ≥ 16 years sexual debut (Table 1).

Previous testing for HIV was reported by 72.2% (1,934/2,680) of participants (Table 2). In the multivariable analysis, SGM with a <16-year sexual debut were 24% less likely to have tested for HIV as compared to those with a ≥ 16 -year sexual debut (aOR: 0.76; 95% CI: 0.62–0.93) after adjusting for education, HIV status, number of receptive sex partners, condomless anal sex, ever being forced to have sex, disclosure to family, and HIV health information. In addition, participants with more than senior secondary education were three times more likely to have ever tested for HIV compared to those with less education (aOR: 3.00; 95% CI: 2.39–3.76). Participants who had disclosed their sexual orientation to family were 70% more likely to have been tested for HIV (aOR: 1.70; 95% CI: 1.26–2.31) compared to those who had not disclosed.

For HIV care engagement at our SGM-friendly clinics (diagnosis, ART, and viral suppression), 86.3% (2,314/2,680) of participants completed laboratory testing at the clinic, 50.3% (543/1,079) initiated ART within six months, and 77.3% (420/543) achieved viral suppression (<20 copies/mL) within a year of initiating treatment (Table 3). In the unadjusted analysis, SGM with a <16-year sexual debut were 30% more likely to be

diagnosed with HIV as compared to those with a ≥ 16 -year debut (OR: 1.30, 95% CI: 1.09–1.56) (Table 4). However, in the multivariable analysis, <16 -year debut was no longer associated with an HIV diagnosis after adjusting for confounders (aOR: 1.02, 95% CI: 0.83–1.25). SGM with a <16 -year debut were similar to those with ≥ 16 -year debut regarding ART initiation within six months and achieving viral suppression within a year of HIV diagnosis in the multivariable analyses (all $p > 0.05$) at our SGM friendly clinics. (Table 3–4).

Independent predictors of HIV testing at our clinic included older age (20–24 vs 16–19, aOR: 2.08; 95% CI: 1.56–2.77; 25+ vs. 16–19, aOR: 3.24; 95% CI: 2.41–4.35), identifying as transgender on non-binary (aOR: 1.31, 95% CI: 1.03–1.66), having three or more receptive partners in the past year (aOR: 2.53; 95% CI: 2.08–3.08), ever having condomless sex (aOR: 4.33; 95% CI: 3.15–5.95), ever being forced to have sex (aOR: 1.42; 95% CI: 1.15–1.77), moderate to severe depression (aOR: 1.34; 95% CI: 1.00–1.81), unknown depression (aOR: 2.02, 95% CI: 1.61–2.54) and disclosure of sexual identity to family (aOR: 1.80; 95% CI: 1.39–2.32). Persons with unknown depression levels (aOR: 0.31; 95% CI: 0.21–0.46) and who received HIV health information (aOR: 0.61; 95% CI: 0.46–0.81) were less likely to take ARTs within six months of HIV diagnosis. Independent predictors of viral suppression within a year of diagnosis included identifying as transgender or non-binary (aOR: 1.46; 95% CI: 1.05–2.03) and having received HIV health information (aOR: 1.48; 95% CI: 1.12–1.96). However, persons who engaged in transactional sex were less likely to achieve viral suppression (aOR: 0.67; 95% CI: 0.50–0.89) (Table 4).

Sixty three percent of our sample (1699/2680) had unknown levels of depression making it difficult to differentiate minimal from moderate to severe associations for some of the HIV care engagement outcomes. Levels of stigma (low, moderate, high) were not associated with age of anal sexual debut or any of the four HIV care engagement outcomes ($p > 0.05$) (Tables 1–4).

DISCUSSION

Our study found that 30% of our cohort reported a sexual debut under 16 years of age. As seen in prior studies,^{41–43} a younger sexual debut appeared to be an individual determinant of a more vulnerable population for HIV because of its association with more receptive sex partners, condomless sex, and transactional sex. In addition, persons with <16 -year sexual debut were less likely to have previously accessed HIV testing. However, having <16 -year sexual debut was not helpful in identifying who was more likely to engage with HIV testing, uptake ART within six months, or achieve viral suppression in 12 months once engaged with our clinics. Despite the null association with age of sexual debut, our results suggested other indicators of a vulnerable population that were inversely or not associated with prior testing, such as more receptive sexual partnerships, condomless sex, and depression. These indicators were significantly associated with testing in our SGM-friendly clinics potentially due to the inclusive environment provided by such care models that minimize sexual health disparities.

Although tailored care models are important for retention in HIV care,^{44,45} engagement in our cohort with HIV care engagement was not close to the goals of 95% tested, 95% on

ART, and 95% virally suppressed. Consistent with a prior study, engagement in HIV care remains low for SGM in Africa⁴⁶ highlighting the need to continue to incorporate inclusive and non-discriminatory practices in sexual health clinics. This is particularly prudent as our study found that a vulnerable population, those who exchanged sex, were least likely to achieve viral suppression. Similar challenges for particularly vulnerable populations like sex workers and individuals with more receptive partners have been noted elsewhere and may be partially explained by lack of self-efficacy⁴⁷ or intersections of multiple manifestations of stigma^{48,49} faced by these populations. Further work is needed to explore the unique barriers experienced by these vulnerable individuals in Nigeria to continue to modify and strengthen our care model to ensure all individuals fully engage with HIV care.

While our primary focus for this work was age of sexual debut, the associations with higher education, disclosure about sexual preferences for men, and HIV health information provide insights for understanding how individuals navigate HIV testing and care. Consistent with prior literature, openness⁵⁰ and HIV literacy^{22–26} were important drivers of HIV testing independent of sexual debut. A Nigerian study found that engaging in sexual health conversations without fear or judgement positively affected knowledge and views on HIV.⁵¹ An additional nonrandomized controlled study in Nigeria found that HIV-specific peer advocates were associated with increased HIV testing and linkage to care for SGM⁵² underscoring an important component to consider in future interventions. Moreover, our prior research found longer engagement in care at TRUST/RV368 to improve levels of HIV-related knowledge.⁵³ Although the positive impacts of comprehensive sex and HIV educational programs on adolescent sexual behavior has been documented,⁵⁴ studies have found suboptimal exposure to sexual education in Nigeria.^{55,56} This is particularly true for SGM where structural discrimination and criminalization have inherently led to an exclusion of same-sex specific sexual education at the school-level⁵⁷ further highlighting the importance of SGM-friendly care centers as a way to disseminate and distribute health knowledge.

A limitation of our study is the assumption that participation in HIV-related talks or meetings equates to the receipt of HIV health information. Although attendance at these events suggests exposure to information, it does not guarantee comprehension or retention of the knowledge presented. Furthermore, the question may have captured exposure to HIV information after an HIV test diagnosis if the diagnosis occurred more than a year prior. Statistically, while the possibility of reverse causation cannot be entirely discounted, the study's findings still underscored significant correlations with meetings on HIV/AIDS. Additional studies that evaluate the strength of learning from peers⁵² and include a scale of knowledge questions could better establish HIV literacy.⁵⁸ Further, we pooled transgender and non-binary individuals together because they comprised only 20% of the population and this may not acknowledge important differences on gender identity and our various outcomes.

An additional limitation was that we could not differentiate persons who already knew their HIV status and were taking ART prior to engagement with our SGM-friendly clinics as we evaluated engagement with HIV care beginning at enrollment. We attempted to minimize this bias by excluding those who entered the cohort virally suppressed. Our frequency of

testing for HIV viral loads differed between sites (4 times a year in Abuja and twice a year in Lagos) and may have contributed to misclassification of those who were virally suppressed. Although, most participants-initiated ART soon after enrollment and both sites were testing for viral loads at the annual follow-up visit. Interestingly, we also found a null association between stigma and the HIV care engagement outcomes³⁹ in contrast to our prior work.⁵⁹ A possible explanation may be temporal changes in stigma experiences. Our current analyses had four additional years of enrollment as compared to the earlier analyses. A temporal change in stigma experiences is in part supported by the fact that more individuals in the current analyses were found to have lower or moderate stigma rather than high stigma in our prior analysis.⁵⁹ Lastly, sexual debut was defined as the age of first anal sex with another man, but our study does not allow us to determine whether an individual's anal debut was consensual and did not account for other types (e.g., heterosexual) of sexual debut. Further research about whether sex was forced at debut is needed as this may have different implications for engagement with care.

Conclusion

Our study highlights that those with a <16-year sexual debut were less likely to engage in prior HIV testing but a <16-year sexual debut was not a discriminating factor for identifying who engaged in our HIV care outcomes at TRUST/RV368. The SGM-friendly care model in Nigeria may promote engagement but continues to need modifications to engage the most vulnerable SGM who may lack the agency to fully access HIV care. Future qualitative research can provide a way to explore in-depth questions pertaining to the roles of sexual debut on engagement with health care settings. Overall, this study suggests that strengthening SGM-focused sexual health education may be an avenue for mitigating existing disparities with potential relevance for other global settings.

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Table 1.
Demographic and Behavioral Distributions of SGM by Age of Sexual Debut

Characteristic:	Age of Sexual Debut			P*
	<16 N=805 (n %)	≥16 N=1,875 (n %)		
Age at enrollment	220 (27.3)	233 (12.4)	<0.01	
16–19	329 (40.9)	814 (43.4)		
20–24	256 (31.8)	828 (44.2)		
25+				
Education			<0.01	
≤Senior secondary	606 (75.5)	1,179 (63.0)		
>Senior secondary	197 (24.5)	692 (37.0)		
Living with HIV			<0.01	
No	323 (40.1)	912 (48.6)		
Yes	341 (42.4)	738 (39.4)		
Unknown	141 (17.5)	225 (12.0)		
Gender Identity			<0.01	
Cisgender	605 (75.3)	1,573 (84.3)		
Transgender or non-binary	198 (24.7)	292 (15.7)		
Sexual orientation			<0.01	
Homosexual	352 (43.8)	509 (27.2)		
Bisexual or other	452 (56.2)	1,362 (72.8)		
Receptive sex partners (past year)			<0.01	
0–2	347 (44.5)	1,149 (63.5)		
3+	433 (55.5)	662 (36.6)		
Exchanged sex (past year)			<0.01	
No	375 (48.7)	1,085 (60.0)		
Yes	395 (51.3)	722 (40.0)		
Ever condomless anal sex			<0.01	
No	84 (10.5)	364 (19.5)		
Yes	717 (89.5)	1,499 (80.5)		

Characteristic:	Age of Sexual Debut		p*
	<16 N=805 (n %)	≥16 N=1,875 (n %)	
Ever being forced to have sex			<0.01
No	544 (67.9)	1,467 (78.5)	
Yes	257 (32.1)	401 (21.5)	
Depression (PHQ-9 †)			<0.01
Minimal (0–4)	120 (14.9)	497 (26.5)	
Moderate to Severe (5+)	105 (13.0)	259 (13.8)	
Unknown	580 (72.1)	1,119 (59.7)	
Disclosure to family €			0.03
No	671 (83.4)	1,624 (86.7)	
Yes	134 (16.6)	250 (13.3)	
Stigma			0.44
Low	420 (52.2)	962 (51.3)	
Moderate	311 (38.6)	710 (37.9)	
High	74 (9.2)	203 (10.8)	
HIV health information ‡			0.03
No	251 (31.2)	667 (35.6)	
Yes	309 (38.4)	719 (38.4)	
Unknown	245 (30.4)	449 (26.0)	

Abbreviations: No, Number; PHQ-9, The Patient Health Questionnaire-9; SGM, sexual gender minorities.

* Chi-Square Test;

† Questionnaire scoring was determined according to developer convention;

€ Disclosure to family derived from question “Have you told any member of your family that you have sex with other men or that you are attracted to other men?”;

‡ HIV health information derived from question “In the past 12 months, you participated in any talks or meetings related to HIV/AIDS?” that was within a module “Exposure to Health Information”. **Bolded** indicates p<0.05

Table 2. Multivariable Association of Age of Sexual Debut with Outcome 1: Testing for HIV before Study Enrollment

Characteristic:	Have you ever been tested for HIV?			Adjusted Odds Ratio (95% CI)
	No N=746 n (row %)	Yes N=1,934 n (row %)	Unadjusted Odds Ratio (95% CI)	
Age of sexual debut				
≥16	477 (25.4)	1,398 (74.6)	Ref.	0.76 (0.62–0.93)
<16	269 (33.4)	536 (66.6)	0.68 (0.57–0.81)	
Age at enrollment				
16–19	199 (43.9)	254 (56.1)	Ref.	3.00 (2.39–3.76)
20–24	334 (29.2)	809 (70.8)	1.90 (1.52–2.38)	
25+	213 (19.7)	871 (80.4)	3.20 (2.52–4.07)	
Education				
≤Senior secondary	628 (35.2)	1,157 (64.8)	Ref.	Ref.
>Senior secondary	116 (13.1)	773 (86.9)	3.62 (2.91–4.50)	
Living with HIV				
No	353 (28.6)	882 (71.4)	Ref.	Ref.
Yes	215 (19.9)	864 (80.1)	1.61 (1.33–1.95)	
Unknown	178 (48.6)	188 (51.4)	0.42 (0.33–0.54)	
Gender Identity				
Cisgender	611 (28.1)	1,567 (71.9)	Ref.	1.57 (1.26–1.95)
Transgender or non-binary	132 (26.9)	358 (73.1)	1.06 (0.85–1.32)	
Sexual orientation				
Homosexual	300 (34.8)	561 (65.2)	Ref.	0.67 (0.49–0.92)
Bisexual or other	445 (24.5)	1,369 (75.5)	1.65 (1.38–1.96)	
Receptive sex partners (past year)				
0–2	355 (23.7)	1,141 (76.3)	Ref.	Ref.
3+	374 (34.2)	721 (65.8)	0.60 (0.50–0.71)	
Exchanged sex (past year)				
No	363 (24.9)	1,097 (75.1)	Ref.	0.76 (0.61–0.96)
Yes	362 (32.4)	755 (67.6)	0.69 (0.58–0.82)	

Characteristic:	Have you ever been tested for HIV?			Unadjusted Odds Ratio (95% CI)	Adjusted Odds Ratio (95% CI)
	No N=746 n (row %)	Yes N=1,934 n (row %)			
Ever condomless anal sex					
No	143 (31.9)	305 (68.1)	Ref.		Ref.
Yes	600 (27.1)	1,616 (72.9)	1.26 (1.01–1.57)		1.01 (0.79–1.30)
Ever being forced to have sex					
No	585 (29.1)	1,426 (70.9)	Ref.		Ref.
Yes	159 (24.2)	499 (75.8)	1.29 (1.05–1.58)		1.31 (1.05–1.63)
Depression (PHQ-9) †					
Minimal (0–4)	149 (24.2)	468 (75.8)	Ref.		
Moderate to Severe (5–20)	75 (20.6)	289 (79.4)	1.23 (0.90–1.68)		
Unknown	522 (30.7)	1,177 (69.3)	0.72 (0.58–0.89)		
Disclosure to family €					
No	683 (29.8)	1,612 (70.2)	Ref.		Ref.
Yes	63 (16.4)	321 (83.6)	2.16 (1.62–2.87)		1.70 (1.26–2.31)
Stigma					
Low	368 (26.6)	1,014 (73.4)	Ref.		
Moderate	300 (29.4)	721 (70.6)	0.87 (0.73–1.04)		
High	78 (28.2)	199 (71.8)	0.93 (0.69–1.23)		
HIV health information ‡					
No	296 (32.2)	622 (67.8)	Ref.		Ref.
Yes	149 (14.5)	879 (85.5)	2.81 (2.25–3.51)		2.71 (2.15–3.41)
Unknown	301 (41.0)	433 (59.0)	0.68 (0.56–0.84)		1.08 (0.83–1.42)

Abbreviations: OR, Odds Ratio; CI, Confidence Interval; No, Number; PHQ-9, The Patient Health Questionnaire-9; Ref, Reference.

[†]Questionnaire scoring was determined according to developer convention;

[€]Disclosure to family derived from question “Have you told any member of your family that you have sex with other men or that you are attracted to other men?”;

[‡]HIV health information derived from question “In the past 12 months, you participated in any talks or meetings related to HIV/AIDS?” that was within a module “Exposure to Health Information”. **Bolded** indicates p<0.05

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HIV Engagement at TRUST/RV368									
Characteristic:	HIV Diagnosis		ART by 6 months			Viral Suppression by 12 Months			
	Negative N=1,235 n (row %)	Positive N=1,079 n (row %)	P *	No N=467 n (row %)	Yes N=543 n (row %)	P *	No N=616 n (row %)	Yes N=420 n (row %)	P *
Ever being forced to have sex			<0.01			0.95			0.10
	995 (57.0)	751 (43.0)		322 (46.1)	377 (53.9)		399 (62.7)	237 (37.3)	
Yes	232 (41.7)	325 (58.3)	<0.01	143 (46.3)	166 (53.7)	<0.01	199 (68.4)	92 (31.6)	0.06
	420 (68.1)	197 (31.9)		53 (27.5)	140 (72.5)		126 (70.0)	54 (30.0)	
Depression (PHQ-9 [‡])			<0.01			<0.01			0.77
	208 (57.1)	156 (42.9)		34 (22.8)	115 (77.2)		97 (69.3)	43 (30.7)	
Moderate-severe (5+)	607 (45.5)	726 (54.5)	<0.01	380 (56.9)	288 (43.1)	<0.01	377 (61.9)	232 (38.1)	0.42
	1,105 (56.1)	864 (43.9)		370 (45.1)	450 (54.9)		488 (64.8)	265 (35.2)	
Disclosure to family [€]			<0.01			0.14			0.42
	129 (37.5)	215 (62.5)		97 (51.1)	93 (48.9)		112 (63.6)	64 (36.4)	
Yes	638 (53.6)	552 (46.4)	0.94	239 (46.0)	281 (54.0)	0.87	298 (62.6)	178 (37.4)	0.04
	473 (53.3)	414 (46.7)		180 (47.1)	202 (52.9)		235 (67.0)	116 (33.0)	
Stigma	124 (52.3)	113 (47.7)	<0.01	48 (44.4)	60 (55.6)	<0.01	67 (65.7)	35 (34.3)	0.04
	471 (51.4)	446 (48.6)		137 (31.8)	294 (68.2)		296 (68.8)	134 (31.2)	
HIV health information [‡]			<0.01			<0.01			0.04
	507 (49.3)	521 (50.7)		247 (50.0)	247 (50.0)		298 (60.8)	192 (39.2)	
No	257 (69.7)	112 (30.4)	<0.01	83 (97.7)	2 (2.3)	<0.01	6 (66.7)	3 (33.3)	0.04
Yes			<0.01			<0.01			0.04
Unknown			<0.01			<0.01			0.04

Abbreviations: No, Number; PHQ-9, The Patient Health Questionnaire-9; SGM, sexual gender minorities.

* Chi-Square Test;

[‡] Questionnaire scoring was determined according to developer convention;

[€] Disclosure to family derived from question “Have you told any member of your family that you have sex with other men or that you are attracted to other men?”;

[‡] Exposure to HIV health information derived from question “In the past 12 months, you participated in any talks or meetings related to HIV/AIDS?” that was within a module “HIV Health Information” .
Bolded indicates p<0.05

Table 4. Multivariable association of Age of Sexual Debut with Outcomes 2, 3, and 4: the HIV Care Engagement at an SGM-Friendly Clinic

Characteristics	HIV Engagement at TRUST/RV368					
	HIV Diagnosis		ART by 6 months		Viral Suppression by 12 months	
	Unadjusted OR (95% CI)	Adjusted OR (95% CI)	Unadjusted OR (95% CI)	Adjusted OR (95% CI)	Unadjusted OR (95% CI)	Adjusted OR (95% CI)
Age of sexual debut						
<16 vs. ≥16	1.30 (1.09–1.56)	1.02 (0.83–1.25)	0.87 (0.67–1.14)	1.08 (0.80–1.46)	0.96 (0.72–1.29)	0.92 (0.68–1.25)
Age at enrollment						
22–25 vs. 16–21	1.80 (1.39–2.32)	2.08 (1.56–2.77)	0.76 (0.48–1.20)		0.66 (0.41–1.08)	
26+ vs. 16–21	2.45 (1.90–3.16)	3.24 (2.41–4.35)	0.91 (0.58–1.43)		0.83 (0.52–1.34)	
Education						
>SSS vs. ≤ SSS	1.17 (0.98–1.39)		1.44 (1.11–1.86)	1.28 (0.96–1.71)	1.27 (0.96–1.67)	
Gender Identity						
Trans/non-binary vs. cisgender	1.54 (1.25–1.90)		0.82 (0.61–1.10)		1.37 (0.99–1.89)	1.46 (1.05–2.03)
Sexual orientation						
Bisexual/other vs. homosexual	0.69 (0.58–0.83)		1.31 (1.01–1.70)		0.93 (0.70–1.24)	
Receptive sex partners (past year)						
>3 vs. 0–2	2.88 (2.42–3.43)	2.53 (2.08–3.08)	0.93 (0.72–1.20)		1.04 (0.79–1.37)	
Exchanged sex (past year)						
Yes vs. no	0.95 (0.80–1.12)		0.86 (0.66–1.11)		0.72 (0.54–0.96)	0.67 (0.50–0.89)
Ever condomless anal sex						
Yes vs. no	6.16 (4.55–8.33)	4.33 (3.15–5.95)	1.11 (0.63–1.98)		0.90 (0.48–1.67)	
Ever being forced to have sex						
Yes vs. no	1.86 (1.53–2.25)	1.42 (1.15–1.76)	0.99 (0.76–1.30)		0.78 (0.58–1.05)	
Depression (PHQ-9) [†]						
Mod-severe vs. minimal	1.60 (1.22–2.09)	1.35 (1.00–1.81)	1.28 (0.78–2.10)	1.37 (0.79–2.39)	1.03 (0.64–1.67)	
Unknown vs. minimal	2.55 (2.09–3.12)	2.02 (1.61–2.54)	0.29 (0.20–0.41)	0.31 (0.21–0.46)	1.44 (1.00–2.05)	
Disclosure to family [€]						
Yes vs. no	2.13 (1.68–2.70)	1.80 (1.39–2.33)	0.79 (0.57–1.08)		1.05 (0.75–1.48)	
Stigma						
Moderate vs. low	1.01 (0.85–1.20)		0.95 (0.73–1.24)		0.83 (0.62–1.10)	

HIV Engagement at TRUST/RV368						
Characteristics	HIV Diagnosis		ART by 6 months		Viral Suppression by 12 months	
	Unadjusted OR (95% CI)	Adjusted OR (95% CI)	Unadjusted OR (95% CI)	Adjusted OR (95% CI)	Unadjusted OR (95% CI)	Adjusted OR (95% CI)
High vs. low	1.05 (0.80–1.39)		1.06 (0.70–1.61)		0.87 (0.56–1.37)	
HIV health information [‡]						
Yes vs. no	1.09 (0.91–1.30)		0.47 (0.36–0.61)	0.61 (0.46–0.81)	1.42 (1.08–1.87)	1.48 (1.12–1.96)
Unknown vs. no	0.46 (0.36–0.60)		0.01 (0.00–0.05) 0	0.01 (0.00–0.05)	1.10 (0.27–4.48)	1.24 (0.30–5.07)

Abbreviations: OR, Odds Ratio; CI, Confidence Interval; No, Number; PHQ-9, The Patient Health Questionnaire-9; SSS, senior secondary school; Mod, moderate; Trans, transgender

[‡] Questionnaire scoring was determined according to developer convention;

[¶] Disclosure to family derived from question “Have you told any member of your family that you have sex with other men or that you are attracted to other men?”;

[‡] HIV health information derived from question “In the past 12 months, you participated in any talks or meetings related to HIV/AIDS with other MSM?” that was within a module “Exposure to Health Information”. **Bolded** indicates p<0.05