



# Anticipated HIV Stigma and Delays in Regular HIV Testing Behaviors Among Sexually-Active Young Gay, Bisexual, and Other Men Who Have Sex with Men and Transgender Women

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## Abstract

Young gay, bisexual and other men who have sex with men (YGBMSM) and young transgender women are disproportionately affected by HIV/AIDS. The success of biomedical prevention strategies is predicated on regular HIV testing; however, there has been limited uptake of testing among YGBMSM and young transgender women. Anticipated HIV stigma—expecting rejection as a result of seroconversion—may serve as a significant barrier to testing. A cross-sectional sample of YGBMSM ( $n = 719$ , 95.5%) and young transgender women ( $n = 33$ , 4.4%) ages 15–24 were recruited to participate in a one-time survey. Approximately one-third of youth had not tested within the last 6 months. In a multivariable model, anticipated HIV stigma and reporting a non-gay identity were associated with an increased odds of delaying regular HIV testing. Future research and interventions are warranted to address HIV stigma, in order to increase regular HIV testing among YGBMSM and transgender women.

## Resumen

Los hombres jóvenes homosexuales, bisexuales o que tienen sexo con hombres (YGBMSM) y las mujeres jóvenes transgénero, son afectados desproporcionalmente por el VIH/SIDA. El éxito de las estrategias de prevención biomédicas se basa en pruebas de VIH frecuentes; sin embargo, entre los YGBMSM y las mujeres jóvenes transgéneros ha habido una aceptación limitada a hacerse la prueba de VIH. Esperar el rechazo como resultado de seroconversión a VIH es un estigma anticipado que puede servir como una barrera significativa para realizarse la prueba. Una muestra transversal de hombres YGBMSM ( $n = 719$ , 95.5%) y de mujeres jóvenes transgéneros ( $n = 33$ , 4.4%), entre las edades de 15 a 24 años, fueron reclutados para participar en una encuesta transversal. Aproximadamente un tercio no se habían realizado la prueba durante los pasados seis meses. En un modelo multivariado, el estigma anticipado de VIH y la identidad no-homosexual estuvieron asociados con un incremento en la probabilidad de posponer la prueba regular de VIH. Futuras investigaciones e intervenciones se necesitan para aumentar la frecuencia de la prueba de VIH entre los hombres YGBMSM y las mujeres transgéneros.

**Keywords** Stigma · HIV testing · Youth · Gay and bisexual men · Young transgender women

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## Introduction

In 2015, youth (aged 13–24 years) accounted for an estimated 22% (8737) of all new HIV infections (39,513) in the United States (U.S.) [1]. Although there has been a recent decrease in the overall incidence of HIV, Black young gay, bisexual and other men who have sex with men (YGBMSM) and transgender women continue to be disproportionately affected by HIV [2, 3]. Additional evidence indicates that transgender women (i.e., individuals with a feminine and/or female gender identity who were assigned male sex at birth) are disproportionately affected by HIV and have the highest rates of new diagnoses by sex assigned at birth (2.1%, compared to 1.2% among males and 0.4% among females) [4]. Furthermore, nearly 14% of youth living with HIV are estimated to be undiagnosed in the U.S., of whom 52% are youth ages 13–24 who are assigned a male sex at birth and who have sex with men [5].

Regular HIV testing is critical for ensuring that YGBMSM and transgender women are linked to appropriate HIV prevention and treatment services [6]. There have been significant advances in biomedical HIV prevention strategies, such as pre-exposure prophylaxis (PrEP); however, the success of these biomedical HIV prevention strategies is dependent on individuals knowing their HIV serostatus. As a result, both policy makers and public health officials have engaged in multiple efforts to facilitate regular HIV testing among these populations [7]. The CDC guidelines now recommend that all sexually active individuals, including youth, receive an HIV test every 3–6 months [8, 9].

Existing evidence suggests that a syndemic of factors including younger age, being non-gay identified (e.g., bisexual or heterosexual), engaging in substance use, a history of homelessness, and engaging in fewer high-risk behaviors have been linked to not testing for HIV [10–13]. Another potential reason for decreased testing frequency is anticipated HIV stigma (i.e., an HIV-negative individual's expectation that they would experience rejection if they were to become HIV-infected) [14–17]. Research suggests that individuals may undermine their own health to reduce their association with a stigmatized condition [18]. For example, studies illustrate that people at risk for HIV or living with HIV may delay or not access care in order to avoid anticipated rejection by providers, families and the general public [14, 17, 19].

Anticipated HIV stigma has been associated with not receiving an HIV test within the last 6 months among an adult sample of gay, bisexual, and other men who have sex with men and transgender women [15]. Although this research has been critical in informing outreach efforts and

programs designed to increase regular HIV testing, limited research has specifically examined how psychosocial factors, such as anticipated HIV stigma, are associated with delaying regular HIV testing among YGBMSM and transgender women.

Stigma is likely to adversely affect youth's engagement in all phases of the HIV care continuum [20]. Among adolescent populations, other people's perceptions of them has a powerful influence on decisions to engage in both risky and protective behaviors [21]. Accordingly, adolescents and young adults might delay HIV testing as a result of anticipated rejection and stigma from others. Although HIV-negative individuals may or may not endorse stigmatizing beliefs or stereotypes about HIV-positive people themselves, they could still have concerns about experiencing rejection from others if they were to receive an HIV diagnosis. The concern about future rejection from others may serve as an important psychological barrier to adolescents and young adults in learning their HIV status. Furthermore, youth are more sensitive to negative social evaluation than adults [22] such that anticipated HIV stigma could play a major role in avoiding regular HIV testing.

For Black YGBMSM and transgender women, complex social and structural experiences may contribute to avoiding regular testing, such as encountering racism, heterosexism, and transphobia within their communities and healthcare settings [23, 24]. Evidence demonstrates that experiences of heterosexism and HIV-related stigma within a larger context of racism is related to avoiding HIV testing among Black YGBMSM [25, 26]. Understanding the role of anticipated HIV stigma on HIV testing behaviors among predominately Black and Latinx YGBMSM and transgender women is essential to the development of public health interventions and programming to engage these young people in HIV prevention services.

The current study was designed to build on prior research with adult samples [15] to examine the unique role of anticipated HIV stigma in distinguishing sexually-active and predominately Black and Latinx YGBMSM and transgender women who report regular HIV testing and those who do not. Accordingly, we hypothesized that sexually-active YGBMSM and transgender women who reported greater anticipated HIV stigma would be less likely to engage in recent HIV testing (i.e., testing within the last 6 months) than those who reported lower anticipated HIV stigma, over and above known covariates of HIV testing behaviors.

## Methods

### Study Design

This research was part of a multi-site study on structural changes and HIV risk among high-risk urban youth. Details

of the study procedures have been described elsewhere [27, 28]. Between August 2012 and December 2013, participants were recruited from 7 research sites located throughout the United States to participate in a one-time survey. Youth were approached at locations, such as clubs, parks, and social service organizations to determine if they were between the ages of 12 and 24 [23, 28]. Venues were selected based on youth's reporting that these were popular venues or were in locations with a high prevalence of HIV and STIs. In these venues, a study recruiter approached youth and obtained verbal consent to screen for eligibility. If youth were eligible, the study recruiter obtained verbal consent to complete the one-time survey. After providing informed assent or consent, participants completed a confidential audio computer assisted interview (ACASI) at a local adolescent medicine clinical unit or near the recruitment venue on a laptop computer. Youth completed the ACASI in English or Spanish. Incentives in the form of gift cards or cash ranged in value from \$20 to 50, depending upon what the local site requested and their IRB approved.

The current study focuses on the seven sites (Los Angeles, Washington, DC, Philadelphia, Detroit, Boston, Denver, and Baltimore) that targeted YGBMSM and a small number of sites that included young transgender women. In total, 753 youth self-reported being recently sexually active, self-reported an HIV-negative or unknown status at the moment of assessment, and had a male sex assigned at birth were recruited from Los Angeles ( $n = 107$ , 14.2%), Washington, DC ( $n = 105$ , 13.9%), Philadelphia ( $n = 109$ , 14.5%), Detroit ( $n = 105$ , 12.9%), Baltimore ( $n = 100$ , 13.3%), Boston ( $n = 105$ , 13.9%), and Denver ( $n = 122$ , 16.2%). No youth under age 15 met these criteria.

## Measures

### Sociodemographic Characteristics

Youth reported their age in years. We then categorized age into developmental groups (1 = 15–17 middle adolescence; 2 = 18–20 late adolescence, 0 = 21–24 early adulthood) [29]. Participants were asked to indicate their sex assigned at birth (1 = male, 0 = female), current gender identity (1 = female, 0 = male), whether they identify as transgender (1 = yes, 0 = no). We created a two-category variable for gender identity (1 = transgender/female vs. 0 = male). Participants were asked their HIV status and we created a two-category variable (1 = unknown vs. 0 = HIV-negative). Participants reported their race and ethnicity. Given the small number of participants who identified as Native American or Alaskan Native ( $n = 7$ ) and other ( $n = 14$ ), we created a four-category race/ethnicity variable (1 = non-Hispanic Black, 2 = Latinx/Hispanic, 3 = non-Hispanic White, 4 = non-Hispanic Other).

Participants reported their sexual orientation identity with response options: (1) Straight/Heterosexual, (2) Gay/Lesbian, (3) Bisexual, (4) Rather not answer, and (5) Not sure or undecided. None of the participants refused to answer the sexual identity variable. Given the small number of participants who identified as Straight/Heterosexual ( $n = 17$ ) and Not sure ( $n = 44$ ), we created a two-category variable (1 = Gay, 0 = Bisexual, Unsure, or Heterosexual). Participants reported if they had ever been homeless (1 = yes, 0 = no). Homelessness was defined as having to stay one night or more in a place that was not their home because they could not stay in their home or did not have a home, including having to stay in temporary housing, a shelter or car.

### Anticipated HIV Stigma

Participants completed an adapted version of the HIV stigma scale [30], which has been shown to have good psychometric properties in studies with youth [26]. The scale is designed to measure the extent to which participants' anticipated negative interpersonal consequences if they were to contract HIV in their future (example items: "If you had HIV, people would think you are unclean"; "If you had HIV, people who think you have been hanging around with the wrong crowd"). All nine items were rated on a Likert-type scale (1 = Strongly Agree to 5 = Strongly Disagree). A principal component factor analysis was conducted to examine the underlying factor structure of the nine items (Kaiser–Meyer–Olkin = 0.94). The items form a single factor, accounting 69.1% of the total variance across the nine items. The 9 items were reverse coded and summed to form an overall anticipated HIV stigma score ( $\alpha = 0.94$ ), with higher values indicating greater anticipated HIV stigma.

### HIV Risky Relationships Score

Participants were asked five questions that we used to create a composite HIV risky relationships score. Participants were asked: (1) if they had ever been diagnosed with an STI (1 = yes, 0 = no); (2) if they had had sex with someone who they suspected were HIV infected in the past 3 months (1 = yes, 0 = no), (3) if they had had sex with someone they knew was HIV infected in the past 3 months (1 = yes, 0 = no), (4) if they had had sex with someone who injected drugs in the past 3 months (1 = yes, 0 = no), and (5) if they had exchanged sex for drugs or money in the past 3 months (1 = yes, 0 = no). These five items were summed such that higher scores indicate greater HIV risk (range 0–5,  $M = 1.07$ ,  $SD = 1.27$ ).

## Substance Use

Participants were asked a series of questions about substance use behaviors in the past 3 months. First, participants were asked how often they had engaged in heavy drinking, defined as five or more drinks on one day, with response options ranging from never to daily or almost daily. Consistent with NIAAA guidelines for males [31], we coded this as monthly heavy episodic drinking if the participant reported having 5 or more drinks on one day at least monthly in the last 3 months. Second, participants were asked if they had used marijuana in the last 3 months (1 = yes, 0 = no). Third, participants were asked if they had used any non-marijuana illicit drugs in the last 3 months (i.e., crack, cocaine, heroin, other narcotics, methamphetamine, amphetamine, ecstasy, club drugs, hallucinogens, barbiturates, or inhalants). Given the small number of participants who endorsed each non-marijuana illicit drug, we created a composite variable of any illicit drug use in the last 3 months (1 = yes, 0 = no).

## HIV Testing Behaviors

Participants were asked: “When was the last time you received an HIV test?” Response options included: (1) within the past month, (2) more than 1 month ago but less than 3 months ago, (3) more than 3 months ago but less than 6 months ago, (4) more than 6 months ago but less than one year ago, (5) more than one year ago but less than 2 years ago, (6) more than 2 years ago, and (7) don’t know. Consistent with the CDC guidelines for sexually active individuals [9], responses were dichotomized as: (1) taking an HIV test more than 6 months (which included youth who did not know when they last received an HIV test) versus (0) taking an HIV test within the last 6 months. There were no significant sociodemographic differences between those who never received an HIV test and those who tested more than 6 months ago.

## Statistical Analyses

Descriptive statistics were calculated for all variables included in the analyses, including the distribution of scales, with appropriate tests for normality (e.g., skewness). Next, we examined bivariate associations between study variables and anticipated HIV stigma scores. Due to the nested nature of the data and consistent with prior studies using these data [26], we fit generalized estimating equation (GEE) models to examine by bivariate associations between sociodemographic, substance use, risk behaviors, and HIV testing behaviors. We chose GEE models because these models treat dependency between participants within study site as a nuisance parameter and provide appropriate estimates by statistically adjusting for this dependency within study site [32].

GEE models were chosen over other methods (e.g., mixed models) because they are robust to model specification error and can handle smaller sample sizes [33]. Finally, we fit a multivariable GEE model to assess whether anticipated HIV stigma was associated with HIV testing behaviors, over and above sociodemographic factors, HIV risky relationship scores, and substance use behaviors.

## Results

Descriptive characteristics of the sample are presented in Table 1. Participants ranged in age from 15 to 24 years old ( $M = 21.14$ ,  $SD = 2.09$ ). The vast majority of the sample identified as a non-transgender man (95.5%) and as a person of color (i.e., 49.9% Black/African American, 26.4% Latinx/Hispanic, and 13.7% Other). Approximately one-third of participants reported being homeless at some point in their lifetime and the majority of the participants self-identified as gay. Nearly one-third (31.6%,  $n = 238$ ) reported monthly or greater heavy episodic drinking, over half (54.7%,  $n = 412$ ) reported using marijuana monthly or greater, and approximately 15% ( $n = 110$ ) reported non-marijuana illicit drug use in the last 3 months. Two-thirds (67.7%,  $n = 510$ ) of the sample self-reported that they had received an HIV test within the last 6 months.

As shown in Table 1, there were significant differences in sociodemographic and other study variables by anticipated HIV stigma score. Participants who were aged 21–24 ( $M = 29.12$ ,  $SD = 9.57$ ) had significantly lower mean anticipated HIV stigma scores than those who were 15–17 years old ( $M = 33.97$ ,  $SD = 5.79$ ) and those who were 18–20 years old ( $M = 30.93$ ,  $SD = 9.39$ ),  $p < 0.001$ . Transgender youth ( $M = 34.09$ ,  $SD = 9.75$ ) had significantly higher anticipated HIV stigma scores compared to their male counterparts ( $M = 30.10$ ,  $SD = 9.36$ ),  $p < 0.05$ . Youth who identified as Gay had significantly lower anticipated HIV stigma scores ( $M = 29.51$ ,  $SD = 9.40$ ) compared to those who identified as Bisexual, Heterosexual, or Unsure ( $M = 31.65$ ,  $SD = 9.28$ ,  $p < 0.01$ ). Youth who reported monthly or greater heavy episodic drinking ( $M = 31.63$ ,  $SD = 9.13$ ) and those who reported monthly or greater marijuana use ( $M = 31.11$ ,  $SD = 8.88$ ) in the last 3 months had significantly higher anticipated HIV stigma scores compared to those who did not report heavy episodic alcohol use ( $M = 29.62$ ,  $SD = 9.48$ ) or report greater than monthly marijuana use ( $M = 29.22$ ,  $SD = 9.93$ ) (both  $p < 0.01$ ). Additionally, those who self-reported that they received an HIV test within the last 6 months ( $M = 29.89$ ,  $SD = 9.38$ ) had significantly lower anticipated HIV stigma scores compared to those who had not received an HIV test for more than 6 months ( $M = 31.05$ ,  $SD = 9.43$ ),  $p < 0.05$ . There was no significant association between HIV risky relationships and anticipated HIV stigma

**Table 1** Sample characteristics by anticipated HIV Stigma (N = 753)

	N (%)	M (SD)	Statistic
Age			F(2, 747) = 5.91**
15–17	31 (4.1)	33.97 (5.79) <sup>a</sup>	
18–20	389 (51.7)	30.93 (9.38) <sup>b</sup>	
21–24	333 (44.2)	29.12 (9.57) <sup>ab</sup>	
Gender identity			t(745) = - 2.39*
Female/trans women	33 (4.4)	34.09 (9.75)	
Male	719 (95.5)	30.10 (9.36)	
Race/ethnicity			n.s.
Black/African American	376 (49.9)	29.35 (9.67)	
Hispanic/Latinx	199 (26.4)	31.37 (9.23)	
Other	103 (13.7)	30.54 (9.58)	
White	75 (10.0)	31.51 (7.85)	
HIV status			n.s.
HIV-negative	640 (85.1)	30.21 (9.36)	
Not sure	112 (14.9)	30.64 (9.68)	
Ever homeless			n.s.
Yes	277 (36.8)	31.62 (9.08)	
No	476 (63.2)	29.46 (9.51)	
Sexual orientation identity <sup>a</sup>			t(746) = - 2.99**
Gay	489 (64.9)	29.51 (9.40)	
Other	264 (35.1)	31.65 (9.28)	
Monthly heavy episodic drinking, last 3 months			t(746) = 2.74**
Yes	238 (31.6)	31.63 (9.13)	
No	515 (68.4)	29.62 (9.48)	
Monthly marijuana use, last 3 months			t(746) = 2.76**
Yes	412 (54.7)	31.11 (8.88)	
No	341 (45.3)	29.22 (9.93)	
Any illicit drug use, last 3 months <sup>a</sup>			n.s.
Yes	110 (14.6)	30.50 (7.56)	
No	643 (85.4)	30.22 (9.69)	
HIV testing history			t(746) = 2.28*
Within past 6 months	510 (67.7)	29.89 (9.38)	
More than 6 months	243 (32.3)	31.05 (9.43)	

<sup>a</sup>Other = heterosexual, bisexual, or unsure

<sup>b</sup>Any illicit drug use = any report of crack, cocaine, heroin, other narcotics, methamphetamine, amphetamine, ecstasy, club drugs, hallucinogens, barbiturates, or inhalants in the last 3 months. Means with the same subscripts differ significantly at  $p < 0.05$  using Tukey's post hoc test

\*\*\*  $p < 0.001$ ; \*\*  $p < 0.01$ ; \*  $p < 0.05$

scores ( $r = 0.01$ ,  $p = 0.856$ , data not shown). Furthermore, there were no significant differences in sexual identity by race/ethnicity or age (data not shown).

Table 2 presents bivariate and multivariable GEE models examining whether anticipated HIV stigma differently predicted not receiving an HIV test within the last 6 months. In bivariate models, every one unit increase in anticipated HIV stigma scores was associated with an increased odds of delaying HIV testing (OR 1.02, 95% CI 1.01, 1.03). Compared to white youth, Black/African American youth had reduced odds of delaying testing (OR 0.53, 95% CI 0.32,

0.87). Youth who had experienced homelessness in their lifetime had increased odds of not receiving an HIV test within the last 6 months (OR 1.60, 95% CI 1.15, 2.22). Additionally, youth who identified as a Gay had a decreased odds of delaying testing compared to those who identified as Bisexual, Heterosexual, or Unsure (OR 0.56, 95% CI 0.44, 0.72).

In the multivariate model, each one unit increase in the anticipated HIV stigma was independently associated with an increased odds (AOR 1.04, 95% CI 1.02, 1.07) of delayed HIV testing. In addition, Gay-identified youth were more

**Table 2** Binary logistic generalized estimating equation (GEE) model predicting not testing for HIV within the past 6 months among young men and transgender women who have sex with men in the United States (N = 753)

	Bivariate model		Multivariable model	
	OR	95% CI	AOR	95% CI
Age				
15–17	1.37	0.64, 2.93	1.14	0.51, 2.56
18–20	1.04	0.76, 1.42	1.03	0.73, 1.43
21–24 (referent)	–	–	–	–
Gender identity				
Female/trans women	0.71	0.31, 1.61	0.70	0.29, 1.57
Male (referent)	–	–	–	–
Race/ethnicity				
Black/African American	0.53*	0.32, 0.87	1.04	0.58, 1.88
Hispanic/Latinx	0.59	0.34, 1.02	1.06	0.58, 1.93
Other	0.71	0.39, 1.31	1.26	0.65, 2.46
White (referent)	–	–	–	–
Ever homeless	1.60**	1.15, 2.22	1.39	0.96, 2.01
Sexual orientation identity <sup>a</sup>				
Gay	0.56***	0.44, 0.72	0.69*	0.49, 0.97
Other	–	–	–	–
HIV risky relationship score	0.63	0.38, 1.04	0.97	0.84, 1.11
Monthly heavy episodic drinking, last 3 months	1.12	0.81, 1.56	1.14	0.79, 1.64
Monthly marijuana use, last 3 months	0.78	0.58, 1.07	0.87	0.62, 1.23
Any illicit drug use, last 3 months <sup>b</sup>	0.93	0.60, 1.44	0.89	0.55, 1.46
Anticipated HIV stigma	1.02*	1.01, 1.03	1.04*	1.02, 1.07

Results are shown from binary logistic generalized estimating equation (GEE) Models

OR odds ratio, 95% CI 95% confidence interval, AOR adjusted odds ratio

<sup>a</sup>Other = heterosexual, bisexual, or unsure

<sup>b</sup>Any illicit drug use = any report of crack, cocaine, heroin, other narcotics, methamphetamine, amphetamine, ecstasy, club drugs, hallucinogens, barbiturates, or inhalants in the last 3 months

\*\*\* p < 0.001; \*\* p < 0.01; \* p < 0.05

likely to have tested for HIV in the past 6 months compared to youth who identified as Bisexual, Heterosexual or Unsure who were more likely to have delayed testing (AOR 0.69, 95% CI 0.49, 0.97).

## Discussion

The success of evolving biomedical HIV prevention strategies, such as Treatment as Prevention (TasP) and PrEP depends on regular HIV testing. Despite the CDC's recommendations that sexually active individuals, including adolescents, receive HIV testing every 3–6 months, we found that nearly one-third of sexually active YGBMSM and transgender women in our sample had not received an HIV test within the past 6 months or longer. These HIV testing rates are similar to those found in representative samples of sexually-active youth [34], and underscores the importance of continued research and intervention efforts to increase HIV testing among YGBMSM and transgender women.

Consistent with prior research [15], our data suggest that anticipated HIV stigma may be a barrier to regular HIV testing among sexually-active predominately Black and Hispanic YGBMSM and transgender women in the U.S. above and beyond other factors known to affect HIV testing (e.g., age, HIV risk behavior, sexual orientation). For adolescents and young adults, the anticipation of rejection from others may be a major barrier in overcoming significant disparities in HIV testing and timely linkage to care or uptake of other prevention strategies (e.g., PrEP).

Numerous studies have shown associations between stigma, discrimination, and delays in seeking care when testing HIV positive, and poor HIV treatment adherence [35–37]. Thus, YGBMSM and transgender women may be avoiding HIV testing because they fear the potential social ostracism which may accompany a positive result. In contrast to fear-based social marketing campaigns, messages which normalize HIV testing have been shown to be successful at increasing HIV testing among adolescents [38]. Thus, social marketing campaigns that counteract stigmatizing beliefs about individuals living with HIV may be effective

in reducing fears of rejection if one were to seroconvert; thereby, increasing regular HIV testing among high-risk adolescents and young adults. These messaging campaigns need to be tailored to the lived realities of YGBMSM of color.

Non-Gay identified individuals in our sample also had increased odds of not testing regularly for HIV. This has been shown in other studies as well [39]. Given that non-gay identified youth had higher anticipated stigma scores, it is possible that youth who do not necessarily identify as gay have more fear of isolation and stigmatization related to testing HIV seropositive. Furthermore, due to the prevalence of gay identity-targeted public health HIV testing campaigns, non-gay identified youth may be unaware of their personal HIV risk, which is a known barrier to HIV testing [40]. To address these barriers, it will be important to create HIV testing campaigns and outreach efforts that are not gay-identity specific, particularly for youth who may not perceive they are at risk for HIV.

Substance use was unrelated to HIV testing behavior in bivariate and multivariable analyses. Furthermore, HIV risky relationship scores were not associated with anticipated HIV stigma or HIV testing behavior. Although we found no relations between substance use and HIV risky relationship scores with HIV testing in this sample, heavy episodic alcohol and marijuana use were associated with greater anticipated HIV stigma scores in bivariate analyses. Alcohol and other substance use has been consistently associated with HIV risk behaviors among youth [41]; however, the youth in this sample may be contending with other forms of stigma which may be more directly related to avoiding healthcare settings, and specifically HIV testing behaviors. Specifically, YGBMSM and transgender women may use substances to cope with stigma and social oppression based on their race/ethnicity, gender identity/expression, and sexual identity [42–45]. As such, future research is warranted to better understand the role of substance use, multiple forms of stigma, and engagement in healthcare settings among YGBMSM and transgender women.

Although there were no significant differences in HIV testing by gender identity, young transgender women reported significantly higher anticipated HIV stigma scores compared to their non-transgender male counterparts. Given the small number of transgender women in this sample, we were unable to examine whether gender identity moderated the association between anticipated HIV stigma and testing behaviors. Nonetheless, these findings are particularly important given that transgender women already experience multiple forms of oppression, including transgender-specific discrimination health care settings [24, 46, 47]. For all youth, feeling safe and being able to trust one's provider is a pre-requisite to successful engagement and retention in care with evidence showing this particularly important

young transgender women [48]. Given the high prevalence of HIV among transgender women, continued research and intervention efforts are needed to ensure that transgender communities are included in HIV prevention research and interventions.

We found that Black youth were at a reduced odds of delaying HIV testing; however, we did not observe differences by race/ethnicity in anticipated HIV stigma scores. Black and Latinx YGBMSM and transgender women experience multiple forms of discrimination and social oppression based on their sexual, gender, and racial/ethnic identity [25, 49, 50]. Previous research has illustrated that discrimination and social oppression, including racism, heterosexism, poverty and HIV stigma are related avoiding HIV testing and care among Black YGBMSM [51]. Thus, other forms of stigma and social oppression may be more salient for Black and Latinx youth than the anticipation of HIV stigma. Future research is needed to elucidate the ways in which intersecting forms of stigma may be associated with anticipated HIV stigma and HIV testing among Black and Latinx YGBMSM and transgender women in order to develop effective public health interventions and programming to engage these young people in HIV prevention services.

## Limitations

The findings must be interpreted within the context of several study limitations. First, the cross-sectional nature of the study design precludes us from making causal inferences on whether anticipated stigma leads to delays in regular HIV testing. Thus, longitudinal studies are warranted to examine whether anticipated HIV stigma leads to delays in regular testing. Although ACASI technology was used to mitigate social desirability bias, self-report data such as HIV testing behaviors and other risky behaviors (e.g., substance use) is still subject to social desirability and recall bias; therefore, future research using biomarkers is recommended. Additionally, there were few transgender women in this study, so caution must be taken in interpreting these findings. Future research should consider targeted efforts to ensure representation of young transgender individuals in HIV prevention research to better understand the ways in which other forms of stigma, including anticipated HIV stigma, is associated with delays in HIV testing [6]. Furthermore, we were unable to stratify models by racial/ethnic identity due to the small number of participants who identified as Other or White non-Hispanic; thus, future research is necessary to better understand the ways in which different forms of stigma and discrimination interact with anticipated HIV stigma to produce delays in HIV testing behaviors among different racial/ethnic populations. Finally, our study did not assess other psychological variables, which may relate to delays in HIV testing, such as risk perception and endorsing negative

stereotypes about people living with HIV that have been associated with delays in HIV testing in prior research with adults and youth [15, 16, 52]. YGBMSM and transgender women may not perceive that they are at risk for HIV and thus, may not believe that testing is appropriate or necessary despite engagement in risk behaviors. Future research assessing testing behaviors among sexual and gender minority youth should make a point of assessing these psychological variables.

## Conclusions

Despite these study limitations, our findings expand prior research [15] by illustrating the importance of anticipated HIV stigma in preventing regular HIV testing among YGBMSM and transgender women. The effectiveness of biomedical HIV prevention strategies and reduction of HIV disparities among adolescents and young adults may be improved by attending to the insidious nature of HIV stigma. Anti-stigma campaigns have the potential to create positive environments for people living with HIV while simultaneously reducing fears of rejection and stigma for young people through altering social norms to increase HIV testing and the uptake of other biomedical prevention strategies. In addition, ensuring that youth have access to community-based organizations, which are inclusive and affirming to all gender identities, sexual practices, and racial/ethnic identities may have the potential offset HIV stigma and ensure access to HIV testing and care.

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## Compliance with Ethical Standards

**Conflict of interest** Each of the authors declare that they have no conflict of interest.

**Ethical Approval** All procedures performed in studies involving human participants were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards.

**Informed Consent** Informed consent was obtained from all individual participants included in the study.

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