Archives of Sexual Behavior (2020) 49:1903–1914
https://doi.org/10.1007/s10508-019-01534-8

ORIGINAL PAPER

Age- and Race/Ethnicity-Specific Sex Partner Correlates of Condomless Sex in an Online Sample of Hispanic/Latino, Black/African-American, and White Men Who Have Sex with Men

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Received: 28 February 2019 / Revised: 26 July 2019 / Accepted: 5 August 2019 / Published online: 16 December 2019

Abstract
We sought to identify and compare correlates of condomless receptive anal intercourse with HIV-positive or unknown status partners (CRAI) for younger (< 25 years) and older (≥ 25 years) Hispanic/Latino, black/African-American, and white men who have sex with men (MSM). Baseline data from the Evaluation of Rapid HIV Self-Testing among MSM Project (eSTAMP), a randomized controlled trial with MSM ($n = 2665$, analytical sample size = 2421), were used. Potential correlates included participants' sociodemographic characteristics and HIV status as well as the characteristics of participants' partners. Younger Hispanic/Latino and black men were most likely to report having older sex partners (≥ 50% of partners being at least 5 years older), and having older partners was a significant correlate of CRAI among younger Hispanic/Latino and white men. Regardless of race/ethnicity, not knowing one's HIV status was a significant correlate of CRAI among younger men, whereas having a black sex partner was a significant correlate among older men. HIV prevention initiatives could address these and other correlates specific to race/ethnicity groups to target their prevention resources and messaging.

Keywords Hispanic/Latino · Black African-American · Men who have sex with men · Condomless sex · Sexual orientation

Introduction

HIV continues to disproportionately affect gay, bisexual, and other men who have sex with men (collectively referred to as MSM) in the U.S., and black or African-American MSM (BMSM) accounted for the highest number of HIV diagnoses in 2017, followed by Hispanic or Latino MSM (HLMSM) (Centers for Disease Control and Prevention [CDC] 2018a). Adolescents and young adults (aged 13–24) accounted for 21% of HIV diagnoses in the U.S. in 2017, and gay and bisexual males (and those aged 20–24) accounted for most of these HIV diagnoses. Young MSM may be particularly vulnerable to HIV-related stigma as they begin to explore their sexuality (CDC, 2018b), and may be uncomfortable using traditional HIV prevention services, including those that provide HIV testing. This notion is supported by the fact that young people have the highest proportion of undiagnosed HIV infections (CDC, 2018b).

Partner characteristics can influence how one engages in sexual behavior. Previous studies have consistently identified partner characteristics, such as age and race/ethnicity, as significant correlates of risky sexual behaviors (e.g., condomless anal intercourse) among MSM. Specifically, having older partners has been found to be associated with engagement in risky sexual behavior among young BMSM (Beck, Birkett, Armbruster, & Mustanski, 2015; Chamberlain, Mena, Geter, & Crosby, 2017), young MSM (Balaji et al., 2018; Beck et al., 2015; Mustanski, Newcomb, & Clerkin, 2011; Newcomb & Mustanski, 2016; Newcomb, Ryan, Garofalo, & Mustanski, 2014), and adult BMSM (Mimiaga et al., 2009; Newcomb & Mustanski, 2013). Studies have generally found a pattern of homophily (same-race/ethnicity preference) for sex partners in racial/ethnic minority MSM (Phillips, Birkett, Hammond,

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& Mustanski, 2016), young MSM (Newcomb, Ryan, Garofalo, & Mustanski, 2015), young BMSM (Newcomb et al., 2015), adult BMSM (Newcomb & Mustanski, 2013), and white MSM (Taylor et al., 2012). Having black partners was significantly correlated with higher HIV prevalence among young MSM (Balaji et al., 2018; Birkett, Kuhns, Latkin, Muth, & Mustanski, 2015). A mathematical modeling study suggests that young BMSM who had older BMSM partners were at the highest risk for acquiring HIV (Beck et al., 2015). Sullivan et al. (2015) found that partners' race was an important factor in explaining black–white disparities in HIV incidence among MSM. It is noteworthy, however, that having a black partner was negatively associated with engagement in condomless anal sex with most recent casual partner among BMSM (Mimiaga et al., 2009). Newcomb et al. (2014) also found that having a black partner was negatively associated with any condomless receptive anal sex among young MSM.

Other studies found that seriousness of the relationship (often as indicated by reporting that a given partner is a primary partner) (Birkett et al., 2015; Mustanski et al., 2011; Newcomb & Mustanski, 2013, 2016; Newcomb et al., 2014; Taylor et al., 2012) and exchanging sex for money or other things (i.e., having "exchange" partners) (Balaji et al., 2018; Tieu et al., 2015) were significant HIV risk factors. Use of the Internet to meet sex partners has dramatically increased among MSM (Grov, Breslow, Newcomb, Rosenberger, & Bauermeister, 2014). Eaton et al. (2016) found that use of sexual networking apps was associated with testing HIV positive among BMSM. By contrast, Mustanski et al. (2011) and Newcomb and Mustanski (2016) found no associations between meeting a partner online and sexual risk behaviors among young MSM.

Although a substantial body of scientific literature has identified partner characteristics as significant correlates of sexual risk behaviors among MSM, very little has compared these correlates by multiple race/ethnicity and age groups. Given different socioeconomic, cultural, historical, and developmental contexts for these men, it is reasonable to expect MSM of different age and racial/ethnic to respond differently to their sex partners' characteristics. Yet, there may be factors that are common across all groups. Exploring these questions can help the field identify HIV prevention strategies that are specific to certain age–racial/ethnicity groups or strategies that could work across these groups. In addition, those previous studies report very little on HLMSM, the group that is one of the most affected subpopulations in the U.S. (CDC, 2018c). We present baseline data from the Evaluation of Rapid HIV Self-Testing among MSM Project (eSTAMP), a large online study of U.S. MSM ($n = 2665$) with a large number ($n = 620$, 23%) of HLMSM, providing an excellent opportunity to study this population and to disaggregate this and other populations by age groups. The primary purpose of this article is to explore and compare age-specific correlates of HIV risk behavior across racial/ethnic groups (HLMSM, BMSM, and white MSM), but we will also compare sociodemographic and partner characteristics across the groups as well. We categorized each group into younger (i.e., less than age 25 years) vs. older (i.e., 25 years and older) persons; thus, we compared the following 6 groups: younger Hispanic/Latino, older Hispanic/Latino, younger black, older black, younger white, and older white. The age cutoff (< 25 vs. 25 and older) reflects CDC surveillance age groupings and follows an example of how youth is defined by the CDC's HIV factsheet on youth (CDC, 2018a), but was also set so we would have sufficient sample size for the youngest segment of this relatively young, Internet-recruited sample. As potential correlates, we focused on participants' sociodemographic characteristics and HIV status as well as the characteristics of participants' partners.

Method

Participants

We report baseline data collected for a randomized control trial (RCT), the Evaluation of Rapid HIV Self-Testing among MSM Project (eSTAMP) (Trial Registration: NCT02067039 available at ClinicalTrial.gov). The goal of the eSTAMP trial was to evaluate the frequency of use, and impact on sexual risk behaviors, of distributed HIV self-tests among US MSM recruited via the internet. Participants were recruited using banner ads on social network, music, and dating internet sites frequented by MSM from March through August 2016. Eligibility criteria included male sex at birth and currently identifying as male, being at least 18 years of age, residing in the U.S., having had anal sex with a man in the past 12 months, not having an HIV diagnosis or a bleeding disorder, not having participated in an HIV vaccine trial, and not taking antiretroviral medications to prevent HIV infection (pre-exposure prophylaxis [PrEP]). Study recruitment, consent, and surveys were all conducted in English, and instructions on conducting the HIV self-tests were provided in both English and Spanish. Enrollment in the trial required internet access so that participants could complete the following activities online: eligibility screening, registering for the study by providing contact information (i.e., name, address, email, phone number), and completing a baseline survey. During the enrollment process, we searched for registrations with potentially duplicate or fraudulent information. We deleted 293 participants that were determined to be duplicate or contain fraudulent information based on a review of Internet Protocol addresses, mailing address, email accounts, and repeated attempts to screen eligible for the study. The total sample size for baseline data was 2665; however, we excluded men who did not identify as Hispanic/Latino, black, or white to obtain an analytical sample size of 2421. More details about the

eSTAMP trial, including sample characteristics, are forthcoming (MacGowan et al., 2019).

Measures

For the present article, in addition to participants' sociodemographic and behavioral characteristics (i.e., education, employment status, household income, health insurance status, self-reported HIV status [i.e., negative vs. unknown], and engagement in condomless receptive anal intercourse with HIV-positive or unknown status men [CRAI] [partner's HIV status was based on participants' perceptions or knowledge and not on HIV test]), we analyzed the following eight binary variables indicating the types of male sex partners with whom participants reported having sex in the previous 3 months: (1) participant reporting that ≥ 50% of their anal sex partners were at least 5 years older; (2) participant having anal sex exclusively with partners of his own race/ethnicity; (3) participant having anal sex with any black partner; (4) participant having anal sex with any Hispanic/Latino partner; (5) participant having anal sex with any white partner; (6) participant first meeting any anal sex partner on a gay-specific dating/hookup online site; (7) participant having a main partner with whom they have anal sex; and (8) participant having any sex partner with whom they exchanged sex for money or drugs (i.e., exchange partner).

Analysis Strategy

We first conducted chi-square analyses to compare sociodemographic (Table 1) and partner characteristics (Table 2) across the 6 age–race/ethnicity groups. In order to determine how these characteristic differ by these groups, we also conducted simple logistic regression estimating the odds of showing each characteristic. In each simple logistic regression, the age–race/ethnicity variable was a predictor and older white participants were used as the reference group because this group had the largest sample size, which made it the most stable category, and also because their sociodemographic data indicated that they were the least disadvantaged, and thus, interpretation of the odds ratios would be more straightforward. When comparisons between two specific age–race/ethnicity groups other than those with older white men needed statistical tests, post hoc chi-square analyses were also conducted (not reported in tables). We then conducted simple logistic regression to assess whether any of the characteristics were associated with CRAI within each of the 6 groups (Table 3). Variables that were associated with CRAI at $p < .10$ in the simple logistic regression models were included in multivariable modeling, and the final model was obtained by backward elimination methods (the threshold p value for retention in the multivariable models was 0.10) for each of the 6 groups (Table 4). Finally, because the association between some of the partner characteristics (e.g., participants having sex with partners of a particular race/ethnicity) and CRAI can be expected to be a function of number of sex partners, we controlled for the number of sex partners in the final model (Table 4) within each of the 6 groups.

Table 1 Sociodemographic characteristics and HIV serostatus of participants by age and race among participants in a randomized trial of distribution of at-home HIV test kits, eSTAMP, USA, 2016–2017

	Education > HS		Employed FT/PT		Household income $40,000 or higher		Have insurance		HIV negative	
Participant	%	OR (p value)	%	OR (p value)	%	OR (p value)	%	OR (p value)	%	OR (p value)
Young Hispanic ($n = 255$)[a]	64.9	.16 (< .001)	77.5	.42 (< .001)	23.5	.21 (< .001)	74.8	.51 (< .001)	67.5	.23 (< .001)
Young black ($n = 101$)[a]	63.4	.16 (< .001)	75.2	.37 (< .001)	11.4	.09 (< .001)	78.0	.61 (.06)	72.3	.29 (< .001)
Young white ($n = 406$)[a]	74.1	.26 (< .001)	79.7	.48 (< .001)	28.7	.27 (< .001)	86.6	1.12 (.50)	67.2	.23 (< .001)
Older Hispanic ($n = 365$)[a]	83.8	.46 (< .001)	87.4	.84 (.34)	42.2	.49 (< .001)	74.3	.50 (< .001)	88.5	.85 (.40)
Older black ($n = 160$)[a]	83.1	.44 (.001)	84.9	.68 (.11)	39.5	.44 (< .001)	75.3	.53 (.002)	85.6	.66 (.09)
Older white ($n = 1134$)[a]	91.8	REF	89.2	REF	59.7	REF	85.2	REF	90.0	REF
Overall difference	$\chi^2 = 173.82$ df = 5 $p < .001$		$\chi^2 = 45.18$ df = 5 $p < .001$		$\chi^2 = 217.50$ df = 5 $p < .001$		$\chi^2 = 42.38$ df = 5 $p < .001$		$\chi^2 = 168.06$ df = 5 $p < .001$	

[a]Due to missing data, the sample sizes do not add up to 2421. Also, sample sizes vary depending on the variables examined

Table 2 Characteristics of sex partners by age and race of participants among participants in a randomized trial of distribution of at-home HIV test kits, eSTAMP, USA, 2016–2017

	≥ 50% of partners were at least 5 years older		Participant had sex exclusively with own race		Participant had sex with any black partner		Participant had sex with any Hispanic partner		Participant had sex with any white partner		Participant first met partner at gay-specific dating/hookup site		Participant had a main partner		Participant had partner to exchange sex for money or drugs	
Participant	%	OR (*p* value)	%	OR (*p* value)	%	OR (*p* value)	%	OR (*p* value)	%	OR (*p* value)	%	OR (*p* value)	%	OR (*p* value)	%	OR (*p* value)
Young Hispanic ($n=255$)[a]	44.1	4.03 (<.001)	22.6	.37 (<.001)	15.5	.79 (.22)	60.7	3.45 (<.001)	58.3	.44 (<.001)	73.6	1.08 (.66)	45.5	1.16 (.29)	3.6	.81 (.58)
Young black ($n=101$)[a]	38.0	3.13 (<.001)	40.0	.84 (.40)	62.0	7.04 (<.001)	26.0	.79 (.31)	30.0	.13 (<.001)	62.4	.64 (.06)	36.6	.80 (.31)	8.9	2.16 (.04)
Young white ($n=406$)[a]	29.1	2.10 (<.001)	51.3	1.32 (.02)	13.8	.69 (.03)	27.9	.86 (.26)	79.1	1.18 (.25)	70.7	.93 (.60)	46.9	1.23 (.08)	3.6	.74 (.34)
Older Hispanic ($n=365$)[a]	27.5	1.94 (<.001)	24.2	.40 (<.001)	19.0	1.01 (.95)	63.2	3.83 (<.001)	56.3	.40 (<.001)	71.1	.95 (.69)	41.1	0.97 (.80)	3.3	.81 (.52)
Older black ($n=160$)[a]	23.3	1.55 (.03)	35.8	.70 (.04)	60.4	6.58 (<.001)	34.6	1.18 (.35)	42.8	.23 (<0.001)	66.4	.76 (.15)	43.8	1.08 (.65)	8.1	1.95 (.04)
Older white ($n=1134$)[a]	16.4	REF	44.4	REF	18.8	REF	30.9	REF	76.3	REF	72.2	REF	41.8	REF	4.3	REF
Overall difference	$\chi^2=109.47$ df = 5 $p<.001$		$\chi^2=101.01$ df = 5 $p<.001$		$\chi^2=258.27$ df = 5 $p<.001$		$\chi^2=199.94$ df = 5 $p<.001$		$\chi^2=203.54$ df = 5 $p<.001$		$\chi^2=6.06$ df = 5 $p=.301$		$\chi^2=6.04$ df = 5 $p=.303$		$\chi^2=12.46$ df = 5 $p=.029$	

[a]Due to of missing data the sample sizes do not add up to 2421. Also, sample sizes vary depending on the variables examined

Table 3 Bivariate associations between participant sociodemographic characteristics, partner characteristics, and condomless receptive anal intercourse with HIV+/unknown status partner (CRAI) in the last 3 months among participants in a randomized trial of distribution of at-home HIV test kits, eSTAMP, USA, 2016–2017

		Hispanic MSM				Black MSM				White MSM			
		Younger Hispanic $n=255$[a]		Older Hispanic $n=365$[a]		Younger black $n=101$[a]		Older black $n=160$[a]		Younger white $n=406$[a]		Older white $n=1134$[a]	
		%	OR[b] (p value)	%	OR[b] (p value)	%	OR[b] (p value)	%	OR[b] (p value)	%	OR[b] (p value)	%	OR[b] (p value)
Sociodemographic characteristics													
Education	>HS	14.8	.69 (.27)	18.2	1.24 (.59)	7.8	.20 (<.01)	16.8	2.32 (.28)	12.0	.46 (<.01)	12.2	.94 (.84)
	≤HS	20.2		15.3		29.7		8.0		23.1		12.9	
Employment status	Employed	15.4	.65 (.26)	19.2	1.89 (.20)	15.8	.98 (.98)	15.3	.90 (.86)	13.8	.66 (.20)	11.4	.52 <.01
	Unemployed	21.8		11.1		16.0		16.7		19.5		19.8	
Household Income	$40,000+	7.8	.34 (.04)	14.8	.66 (.16)	30.0	3.29 (.13)	15.3	0.99 (.98)	13.6	.89 (.74)	11.2	.79 (.21)
	<$40,000	20.2		20.8		11.5		15.4		15.0		13.7	
Had Health Insurance	Yes	13.0	.37 (<0.1)	17.2	.83 (.56)	16.7	1.27 (.73)	17.1	1.70 (.36)	14.4	.74 (.43)	11.1	.54 <.01
	No	29.0		20.0		13.6		10.8		18.5		18.8	
HIV status	Negative	12.9	.45 (.02)	17.5	0.78 (.53)	9.6	0.22 (<0.01)	15.7	1.18 (.81)	12.5	.58 (.06)	11.8	0.71 (.21)
	Unknown	24.7		21.4		32.1		13.6		19.7		15.9	
Partner characteristics													
≥50% of partners were at least 5 years older	Yes	26.4	3.53 (<.01)	19.6	1.15 (.65)	21.1	1.80 (.29)	21.6	1.76 (.24)	23.7	2.47 (<.01)	17.4	1.69 (.02)
	No	9.2		17.5		12.9		13.6		11.2		11.1	
Participant had sex exclusively with own race	Yes	12.5	.65 (.32)	14.8	.74 (.37)	20.0	1.63 (.38)	20.0	1.67 (.25)	12.3	.64 (.11)	9.3	.60 (<.01)
	No	18.1		19.0		13.3		13.0		18.0		14.6	
Participant had sex with any Hispanic partner	Yes	19.1	1.52 (.25)	21.7	2.17 (.02)	19.2	1.36 (.60)	17.0	1.19 (.71)	20.7	1.76 (.05)	17.3	1.88 (<.01)
	No	13.4		11.4		14.9		14.7		12.9		10.0	
Participant had sex with any black partner	Yes	26.3	1.99 (.09)	36.2	3.59 (<.01)	21.0	3.10 (.09)	22.8	5.92 (<.01)	30.9	3.11 (<.01)	25.7	3.43 (<.01)
	No	15.2		13.7		7.9		4.8		12.6		9.2	
Participant had sex with any white partner	Yes	21.9	2.61 (.01)	18.2	1.04 (.88)	20.0	1.50 (.48)	12.1	.63 (.32)	16.9	2.21 (.06)	13.5	1.74 (.02)
	No	9.7		17.6		14.3		18.0		8.4		8.3	
Participant first met partner on gay-specific dating/hookup site	Yes	21.4	3.55 (<.01)	22.1	2.60 (<.01)	20.8	2.25 (.16)	18.6	2.01 (.17)	20.8	7.02 (<.01)	14.5	1.95 (<.01)
	No	7.1		9.8		10.4		10.2		3.6		8.0	
Participant had a main partner	Yes	17.5	1.12 (.73)	15.4	.74 (.30)	16.2	1.05 (.94)	13.4	.77 (.56)	9.5	.43 (<.01)	8.9	.571 (<.01)
	No	15.9		19.7		15.6		16.9		19.6		14.6	
Participant had partner to exchange sex with money or drugs	Yes	44.4	4.41 (.03)	46.2	4.21 (.01)	22.2	1.59 (.59)	30.8	2.73 (.12)	7.7	.48 (.49)	26.5	2.77 (<.01)
	No	15.4		16.9		15.2		14.0		14.8		11.5	

[a]Sample sizes vary depending on the variables examined

[b]In all cases, the reference group of the OR is the bottom of the two values of the variable

Table 4 Multivariable associations[a] with condomless receptive anal intercourse with HIV +/unknown status partner (CRAI) in the last 3 months among participants in a randomized trial of distribution of at-home HIV test kits, eSTAMP, USA, 2016–2017

	Hispanic MSM				Black MSM				White MSM			
	Younger Hispanic		Older Hispanic		Younger black		Older black		Younger white		Older white	
	Final model	Final model adj for number of partners	Final model	Final model adj for number of partners	Final model	Final model adj for number of partners	Final model	Final model adj for number of partners	Final model	Final model adj for number of partners	Final model	Final model adj for number of partners
	OR (*p* value)		OR (*p* value)		OR (*p* value)		OR (*p* value)		OR (*p* value)		OR (*p* value)	
>High School (vs. ≤High School)					.27 (.04)	.20 (.04)			.53 (.05)	.47 (.02)		
Employed (vs. Unemployed)											.60 (.06)	.57 (.04)
Income $40,000+ (vs. <$40,000)	.33 (.07)	.32 (.06)										
Had Health Insurance (vs. not)	.39 (.03)	.41 (.05)									.60 (.04)	.58 (.03)
Participant is HIV-negative (vs. unknown status)	.36 (.02)	.37 (.03)			.28 (.04)	.17 (.03)			.50 (.03)	.40 (<.01)		
≥50% of partners were at least 5 years older (vs. not)	2.69 (.02)	2.41 (.04)							2.11 (.02)	2.17 (.02)	1.74 (.02)	1.53 (.08)
Participant had sex exclusively with own race (vs. not)												
Participant had sex with any Hispanic partner (vs. not)			1.89 (.05)	1.21 (.59)							1.64 (.01)	1.03 (.90)

Table 4 (continued)

	Hispanic MSM				Black MSM				White MSM			
	Younger Hispanic		Older Hispanic		Younger black		Older black		Younger white		Older white	
	Final model	Final model adj for number of partners	Final model	Final model adj for number of partners	Final model	Final model adj for number of partners	Final model	Final model adj for number of partners	Final model	Final model adj for number of partners	Final model	Final model adj for number of partners
	OR (*p* value)		OR (*p* value)		OR (*p* value)		OR (*p* value)		OR (*p* value)		OR (*p* value)	
Participant had sex with any black partner (vs. not)			3.38 (<.01)	2.90 (<.01)	3.97 (.06)	2.40 (.33)	5.92 (<.01)	5.72 (<.01)	2.55 (.01)	2.05 (.06)	3.31 (<.01)	2.11 (<.01)
Participant had sex with any white partner (vs. not)	2.69 (.04)	1.78 (.27)									1.99 (<.01)	0.91 (.74)
Participant first met partner at gay-specific dating/ hookup site (vs. not)	2.78 (.05)	1.47 (.50)	2.16 (.03)	1.21 (.63)					6.01 (<.001)	3.42 (.02)		
Participant had main partner (vs. not)									.54 (.05)	.56 (.09)	.64 (.03)	.64 (.04)
Participant had partner to exchange sex with money or drugs (vs. not)												

[a]Some of the cells are empty either because these variables were not considered in multivariable analyses as they did not meet the threshold *p* value of 0.1 in bivariate analyses or they were dropped by backward elimination in multivariable analyses

Results

Table 1 shows the comparison of sociodemographic characteristics across the six age–race/ethnicity groups. Younger Hispanic/Latino, black, and white men were significantly less likely than older white men to have higher education (64.9%, 63.4%, 74.1% vs. 91.8%, OR [odds ratio] = 0.16, 0.16, 0.26, $p < .001$). Similarly, younger Hispanic/Latino, black, and white men were significantly less likely than older white men to have higher income (23.5%, 11.4%, 28.7% vs. 59.7%, OR = 0.21, 0.09, 0.27, $p < .001$), and were also less likely to be employed (77.5%, 75.2%, 79.7% vs. 89.2%, OR = 0.42, 0.37, 0.48, $p < .001$), and HIV negative (as opposed to unknown status) (67.5%, 72.3%, 67.2% vs. 90.0%, OR = 0.23, 0.29, 0.23, $p < .001$). Younger Hispanic/Latino men were significantly less likely than older white men to have health insurance (74.8% vs. 85.2%, OR = 0.21, $p < .001$). Compared to younger white men, younger Hispanic/Latino men ($\chi^2 = 6.8$, df = 1, $p = .009$) and younger black men ($\chi^2 = 4.6$, df = 1, $p = .03$) were significantly less likely to have greater than a high school education. Younger black men were also significantly less likely than younger Hispanic/Latino men ($\chi^2 = 5.8$ df = 1, $p = .02$) and younger white men ($\chi^2 = 11.2$, df = 1, $p = .001$) to have higher income. Older Hispanic/Latino and black men were significantly less likely than older white men to have higher education (83.8%, 83.1% vs. 91.8%, OR = 0.46, 0.44, $p = < .001$), higher income (42.2%, 39.5%, vs. 59.7%, OR = 0.49, 0.44, $p < .001$), and health insurance (74.3%, 75.3% vs. 85.2%, OR = 0.50, 0.53, $p = < .002$). No statistically significant differences were observed in the proportion of CRAI across groups ($\chi^2 = 9.4$, df = 5, $p > .05$), and median number of sex partners was 2 for all groups except for older Hispanic/Latino men (median = 3) (data not in Table 1).

Table 2 shows the comparison of partner characteristics across the six groups. Younger Hispanic/Latino men had the highest percentage who reported having older partners (44.1%) although the difference between younger Hispanic/Latino men and younger black men (38.0%) was not statistically significant ($\chi^2 = 1.09$, df = 1, $p = .18$). In all racial/ethnic groups, younger men were significantly more likely than older men to have older partners (e.g., 44.1% of younger Hispanic/Latino men vs. 27.5% of older Hispanic/Latino men, $\chi^2 = 18.14$, df = 1, $p < .001$). Hispanic/Latino men (younger and older) and older black men were significantly less likely than older white men to have sex exclusively with partners of their own race/ethnicity (22.6%, 24.2%, 35.8% vs. 44.4%, OR = 0.37, 0.40, 0.70, $p = < .04$), and younger white men were significantly more likely than older white men to have sex exclusively with partners of their own race/ethnicity (51.3% vs. 44.4%, OR = 1.32, $p = .02$).

Black men (younger and older) were significantly more likely than older white men to have black partners (62.0%, 60.4% vs. 18.8%, OR = 7.04, 6.58, $p < .001$), and younger white men were significantly less likely than older white men to have any black partner (13.8% vs. 18.8%, OR = 0.69, $p = .03$). Hispanic/Latino men (younger and older) were significantly more likely than older white men to have any Hispanic/Latino partner (60.7%, 63.2% vs. 30.9%, OR = 3.45, 3.83, $p < .001$). Hispanic/Latino men (younger and older) and black men (younger and older) were significantly less likely than older white men to have any white partner (58.3%, 56.3%, 30.0%, 42.8% vs. 76.3%, OR = 0.44, 0.40, 0.13, 0.23, $p < .001$). In both age groups, black men were significantly less likely to have any white partner than Hispanic/Latino men ($\chi^2 = 22.99$, df = 1, $p < .001$ for younger groups and $\chi^2 = 8.15$, df = 1, $p = .004$ for older groups).

No statistically significant differences were observed among the 6 groups in first having met any partner on a gay-specific dating/hookup online site and having a main partner. Black men (younger and older) were significantly more likely than older white men to have any partner with whom they exchanged sex for money or drugs (8.9%, 8.1% vs. 4.3%, OR = 2.16, 1.95, $p = .04$). In both age groups, black men were significantly more likely to have any exchange partner than other racial groups (e.g., 8.9% of younger black men vs. 3.6% of younger Hispanic/Latino men, $\chi^2 = 4.29$, df = 1, $p = .038$; 8.1% of older black men vs. 3.3% of older Hispanic/Latino men, $\chi^2 = 4.92$, df = 1, $p = .027$).

Table 3 shows bivariate associations of CRAI that identified variables to be included in the multivariable analyses, and Table 4 shows the multivariable correlates of CRAI identified in the final models for each of the six groups. Among younger Hispanic/Latino men, having older partners (vs. not) (OR = 2.69, $p = .02$) and having sex with any white partner (vs. not) (OR = 2.69, $p = .04$) were significantly associated with an increased odds of CRAI in the final model. Having health insurance (vs. not having health insurance) (OR = 0.39, $p = .03$) and HIV-negative status (vs. HIV unknown status) (OR = 0.36, $p = .02$) were significantly associated with a decreased odds of CRAI, meaning that not having health insurance and unknown HIV status were significantly associated with an increased odds of CRAI. After controlling for the number of partners, having older partners (OR = 2.41, $p = .04$) and HIV-negative status (OR = 0.37, $p = .03$) remained significant. Among older Hispanic/Latino men, having sex with any black partner (vs. not) (OR = 3.38, $p < .01$) and first meeting any partner on a gay-specific dating/hookup online site (vs. not) (OR = 2.16, $p = .03$) were significantly associated with an increased odds of CRAI in the final model. After controlling for the number of partners, having sex with black partner (OR = 2.90, $p < .01$) was the only variable that remained significant.

Among younger black men, higher education (i.e., greater than high school vs. high school or less) (OR = 0.27, $p = .04$) and HIV-negative status (OR = 0.28, $p = .04$) were significantly associated with a decreased odds of CRAI in the final model, and after controlling for the number of partners, these variables

remained significant (OR = 0.20, $p = .04$ for higher education and OR = 0.17, $p = .03$ for HIV-negative status), meaning lower education and unknown HIV status were significantly associated with an increased odds of CRAI. Among older black men, having sex with any black partner was the only variable in the final model and it remained significantly associated with an increased odds of CRAI (OR = 5.72, $p < .01$) even after controlling for the number of partners.

Among younger white men, having older partners (OR = 2.11, $p = .02$), having sex with any black partner (OR = 2.55, $p = .01$), and first meeting any partner on a gay-specific dating/hookup online site (OR = 6.01, $p < .001$) were significantly associated with an increased odds of CRAI in the final model. HIV-negative status (OR = 0.50, $p = .03$) was significantly associated with a decreased odds of CRAI, again, indicating that unknown HIV status was significantly associated with an increased odds of CRAI. After controlling for the number of partners, having older partners (OR = 2.17, $p = .02$) and first meeting any partner on a gay-specific dating/hookup online site (OR = 3.42, $p = .02$), as well as higher education (OR = 0.47, $p = .02$) and HIV-negative status (OR = 0.40, $p < .01$), were significant. Among older white men, having older partners (OR = 1.74, $p = .02$), having sex with any Hispanic/Latino partner (OR = 1.64, $p = .01$), having sex with any black partner (OR = 3.31, $p < .01$), and having sex with any white partner (OR = 1.99, $p < .01$) were significantly associated with an increased odds of CRAI in the final model. Having a main partner (vs. not having a main partner) (OR = 0.64, $p = .03$) and having health insurance (OR = 0.60, $p = .04$) were significantly associated with a decreased odds of CRAI. After controlling for the number of partners, having sex with any black partner (OR = 2.11, $p < .01$) and having a main partner (OR = 0.64, $p = .04$), as well as employed status (vs. unemployed) (OR = 0.57, $p = .04$) and having health insurance (OR = 0.58, $p = .04$), were significant.

Discussion

Using baseline data ($n = 2421$) collected from Hispanic/Latino, black, and white MSM who participated in an online RCT of HIV self-testing, we compared sociodemographic and partner characteristics, and sought to identify and compare correlates of CRAI with HIV-positive or unknown status partners for younger (< 25) and older (≥ 25) Hispanic/Latino, black/African-American, and white MSM. Our primary findings are that younger Hispanic/Latino and black men were most likely to report having older sex partners (≥ 50% of partners being at least 5 years older), and having older partners was a significant correlate of CRAI among younger Hispanic/Latino and white men. Regardless of race/ethnicity, not knowing one's HIV status was a significant correlate of CRAI among younger men, whereas having a black sex partner was a significant correlate among older men.

Comparison of sociodemographic characteristics found that minority men were more likely than white men, and younger men were more likely than older men, to be of lower socioeconomic status, replicating findings from previous research (e.g., CDC, 2018c; Gayles, Kuhns, Kwon, Mustanski, & Garofalo, 2016; Jeffries et al., 2018; Millet et al., 2012; Sullivan et al., 2015). Younger men were also more likely than older men to not know their HIV status, signaling a need for this age group to be prioritized for HIV testing initiatives. Comparison of partner characteristics found risk-related differences across the groups. Particularly noteworthy was that younger Hispanic/Latino and black men were most likely to report having older partners, a risk factor that has been reported in previous studies of young MSM (Balaji et al., 2018; Beck et al., 2015; Mustanski et al., 2011; Newcomb & Mustanski, 2016; Newcomb et al., 2014). The reasons for these differences are still poorly understood (Mustanski & Newcomb, 2013).

With its large sample size, our data enabled us to explore age–race/ethnicity-specific correlates of HIV transmission risk behavior, particularly for relatively understudied HLMSM. Among younger Hispanic/Latino men, having older partners and unknown HIV status were significantly associated with CRAI even after controlling for number of sexual partners, and the finding replicates the previous studies of young, non-Hispanic MSM (Balaji et al., 2018; Beck et al., 2015; Chamberlain et al., 2017; Mustanski et al., 2011; Newcomb & Mustanski, 2016). By contrast, for younger Hispanic/Latino men, race/ethnicity of sex partners and meeting sex partners online were not significant after controlling for the number of partners. The null association with meeting sex partners online replicates the findings from studies of young MSM (Mustanski et al., 2011; Newcomb & Mustanski 2016). Among older Hispanic/Latino men, having sex with any black partner was the sole significant correlate of CRAI. Similar to what was observed among young Hispanic/Latino men, meeting sex partners online was not significant after controlling for the number of sex partners.

Our analysis identified a few significant multivariable correlates of CRAI that are common across racial groups. For example, having older partners was a significant correlate among younger Hispanic/Latino and white men. These, along with the finding that younger Hispanic/Latino men were most likely to report having older partners, are critical and warrant attention. Developmental issues and power and economic differentials due to age difference may prevent younger men from effectively negotiating condom use with older partners, and this situation presents an opportunity to intervene with PrEP. The CDC reports that PrEP use is still low among Hispanics/Latinos and blacks (Huang, Zhu, Smith, Harris, & Hoover, 2018). Our finding further suggests that increasing PrEP use among young MSM, particularly Hispanic/Latino and black

men with culturally and age-appropriate programming, may be an important step to take.

Across race/ethnicity, not knowing one's HIV status was a significant correlate of CRAI among younger men. The meaning of this association, however, needs further exploration as it is not theoretically clear whether not knowing one's status leads to engagement in risk behavior or engagement of risk behavior leads one to be reluctant about getting tested for HIV. Some previous studies suggest that fear of testing HIV positive is a barrier to get tested for HIV (MacKellar et al., 2005; Schwarcz et al., 2011), pointing to support for the latter explanation. It is also possible that lack of knowledge or awareness of risk could lead to both engagement in risk behavior and not getting tested for HIV.

Among older men, having a black partner was consistently associated with CRAI across all racial/ethnic groups. This association replicates some previous studies (Birkett et al., 2015; Beck et al., 2015; Sullivan et al., 2015), but contradicts others (Mimiaga et al., 2009; Newcomb et al., 2014). Explanations and implications of our findings, and exploration of why this association was observed only among older men, are topics for future research.

We also identified significant correlates of CRAI specific to younger and older white men. Among younger white men, meeting any partner online was significantly associated with an increased odds of CRAI, while among older white men, having a main partner was significantly associated with a decreased odds of CRAI. These findings contradict previous studies (Newcomb & Mustanski, 2016; Newcomb et al., 2014, 2011; Taylor et al., 2012); however, some of these could be due to the fact that we did not directly measure the association between partner type (e.g., main vs. casual) and sex risk behavior with that partner.

We found that regardless of age, black men were significantly more likely to report having any partner with whom they exchanged sex for money or drugs than white or Hispanic men. This finding is consistent with a finding from another study (Bond, Yoon, Downing, Grov, & Hirshfield, 2019), and may be explained by further exploring factors identified as consistent predictors of transactional sex among MSM including economic hardships (e.g., unemployment, job loss, low income, homelessness), lack of education, and drug use (Bauermeister, Eaton, Meanley, & Pingel, 2017; Bond et al., 2019; Stevens et al., 2017; Voisin, Hotton, & Schneider, 2017). However, unlike Balaji et al. (2018) and Tieu et al. (2015), having any exchange partner was not significantly associated with CRAI in any of the racial/age groups. Also, although we found the pattern of homophily (e.g., Hispanic/Latino men more likely to report having sex with any Hispanic/Latino partner than black or white men) across groups, having sex exclusively with partners of one's own race/ethnicity was not associated with CRAI in any of the groups.

Our study was subject to the following limitations. First, despite the fact that men from 49 states and Puerto Rico were represented (the top five states were California [13%], Texas [10%], Florida [9%], Georgia [6%], and Illinois [5%]; specific state distribution data were not reported in results), this was a convenience sample, and thus, the results are not generalizable to all populations of HLMSM, BMSM, and white MSM, and particularly among MSM who use the websites from which we recruited. Related to this limitation, there were not equal numbers of black, Hispanic, and white men in the sample; however, the proportional representation of non-white men was generally similar to their representation in the U.S. population (black: 12% U.S., 10% of sample; Hispanic; 17% of U.S., 23% of sample). Breaking down the sample further into younger and older may have reduced the statistical power for black men, which may have led to finding very few correlates for younger and older black men. This possibility is supported by the finding of moderate associations (e.g., ORs of 2–3 for black men) which were not statistically significant. Although Hispanics/Latinos comprise diverse subgroups, we did not collect data on the immigration/citizenship status or national origin. Also, because the survey was conducted in English, we may have excluded a segment of HLMSM who felt uncomfortable participating in the study due to language barriers. Our data were cross-sectional; thus, no causation can be inferred. We used baseline data collected for an RCT of HIV self-testing, and the measures used for this analysis were not developed for the purpose of this particular study. Participants' HIV status was self-reported, and partner's HIV status (determined by participants' perception or knowledge, not necessarily by HIV test) may sometimes be misclassified. CRAI, our outcome variable, may not be an accurate proxy for HIV risk, given that the scientific community has now endorsed the $U=U$ (undetectable = untransmittable) concept (Eisinger, Dieffenbach, & Fauci, 2019). However, this variable was the best indicator for HIV risk available from the eSTAMP study that was conducted before the $U=U$ concept was established. Last, a different age cutoff may produce different results. However, we believe the 25 years of age cutoff (less than 25 vs. 25 and older) is a reasonable one as it reflects CDC surveillance age groupings and is used in national HIV reporting. Moreover, with this age cutoff, we were able to focus on the youngest segment of the sample without sacrificing the sample size.

Despite these limitations, to our knowledge, this study is one of the first to include a large sample of HLMSM to identify age–race/ethnicity-specific correlates of HIV risk behavior. Particularly noteworthy was the finding that young HLMSM were likely to partner with men who were older and that those young Hispanic/Latino men who had older partners were more likely to engage in condomless receptive anal intercourse with HIV-positive or unknown status partners. As noted above, young HLMSM may benefit from an intensive PrEP campaign because they may lack the skills to persuade their partners to

use condoms. Prevention planners could use this and other findings (e.g., correlates that are common across groups and correlates that are only specific to certain groups) to target their prevention resources (e.g., PrEP) and prevention messages.

Acknowledgements Funding for this study was provided under CDC contract 200-2011-41989. We acknowledge the contributions of the eSTAMP Study Group (Mary Anne Chiasson, Steven Ethridge, Arin Freeman, Laura Gravens, Darrel Higa, Sabina Hirshfield, Wayne Johnson, AD McNaghten, Brian Mustanski, Jerris Raiford, Akshay Sharma, Laura Wesolowski) for designing and implementing the study. The findings and conclusions in this report are those of the authors and do not necessarily represent the official position of the U.S. Centers for Disease Control and Prevention.

Compliance with Ethical Standards

Conflict of interest 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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