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## Correlates of Condomless Anal Intercourse with Different Types of Sexual Partners among Men who have Sex with Men and Transgender Women in Lima, Peru

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### Abstract

In Lima, Peru, men who have sex with men (MSM) and transgender women (TW) are disproportionately affected by HIV. Patterns of sexual behavior vary by type of sexual partner, which has implications for the design of interventions to reduce HIV transmission within these groups. Among this population, we examine correlates of sex with each of four types of partners (main, casual, one-time, client) and condomless anal intercourse (CAI) with those partners. HIV-negative MSM and TW in Lima completed monthly questionnaires to indicate whether they had any of the four types of partners and whether they had CAI with those partners. Odds ratios were calculated using generalized estimating equations to identify correlates of being in different types of partnerships and CAI within those partnerships. In multivariate analysis of data from 1,831 MSM and TW over 14,792 study visits, CAI was most commonly reported with main partners,

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Conflict of Interest:

Ann Duerr received ART for this project from Merck & Co. and Gilead Sciences Inc. All other authors declare that they have no conflict of interest.

Ethics Approval:

All procedures performed in this study involving human participants were in accordance with the ethical standards of the institutional and/or national research committees, and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards. The study received ethical approval from IRBs at Asociación Civil Impacta y Educación in Lima, Peru; Asociación Vía Libre in Lima, Peru; and Fred Hutchinson Cancer Research Center in Seattle, Washington.

Consent to participate:

Written informed consent was obtained from all individual participants included in the study.

TRIAL REGISTRATION: The Sabes study was registered in March 2013 with the National Institutes of Health at [ClinicalTrials.gov](https://clinicaltrials.gov/ct2/show/study/NCT01815580) (Trial NCT01815580).

followed by casual partners, one-time partners, and clients. Presence of an alcohol use disorder (AUD) significantly increased the odds of CAI with all types of partners (main: OR 1.36 (95% CI 1.17–1.57); casual: 1.49 (1.27–1.75); one-time: 1.45 (1.22–1.72); client 1.52 (1.12–2.08)), while alcohol use in the last 30 days only increased the odds of CAI with main partners. Having one main partner decreased the odds of being in casual and one-time partnerships and of CAI in all types of partnerships. Interventions targeting AUDs and individuals with multiple sexual contacts could reduce CAI and HIV risk in this population.

### Keywords

HIV; sexual behavior; men who have sex with men; condomless anal intercourse; alcohol use disorder

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## BACKGROUND

HIV disproportionately affects men who have sex with men (MSM) and transgender women (TW) in Peru, where these populations have an estimated HIV prevalence of 12% and 16%, respectively (Joint United Nations Programme on HIV/AIDS, 2018). Condomless anal intercourse (CAI) is a primary driver of HIV transmission among MSM and TW (Beyrer et al., 2012, 2013; Poteat et al., 2016). Understanding which individual- and partnership-level factors are associated with CAI among MSM and TW in Lima may highlight targets for interventions to limit HIV transmission.

Studies outside of Peru have found that condom use among MSM varies by sexual partner type, with CAI more commonly reported with main partners than other partner types (Feinstein et al., 2018; Lim et al., 2013; Mor et al., 2011; Rusch et al., 2004). One study of factors associated with anonymous sex among Peruvian MSM and TW with recent HIV or sexually transmitted infection (STI) diagnoses found no differences in CAI between anonymous and non-anonymous partnerships, but did not differentiate between types of non-anonymous partnership (Perez-Brumer et al., 2016). Two additional cross-sectional studies conducted among Peruvian MSM and TW reported that CAI was more common with main, or stable, partners compared to casual, anonymous, or transactional partners (Cambou et al., 2014; Delgado et al., 2017). However, none of these studies have examined correlates of CAI stratified by partner type, which may illuminate specific behaviors or sub-populations that could benefit from targeted intervention to decrease HIV risk.

The Sabes study investigated an expanded treatment-as-prevention (TasP) strategy among MSM and TW in Lima, Peru, and collected detailed data on types of partnerships and sexual behavior (Lama et al., 2018). The primary objectives of this analysis were to identify correlates of being in partnerships with each of four types of partners: main/stable, casual, one-time, and transactional (clients); and to identify correlates of CAI among participants reporting each type of partnership.

## METHODS

### Study Design, Setting, and Population

Data for this analysis were collected as part of the Sabes study, an intervention aiming to optimize an early HIV detection strategy among MSM and TW in Lima, Peru (Lama et al., 2018). MSM and TW at high risk for HIV acquisition who were aged 18 years or older, unaware of their HIV status, and reported at least one male sexual partner in the prior 12 months, were recruited at clinics, community-based organizations, and social venues between July 2013 and September 2015. High risk for HIV acquisition was defined as self-identifying as a sex worker, having a partner with newly diagnosed acute or recent HIV, having symptoms of acute retroviral syndrome, or reporting any of the following in the prior 6 months: anal intercourse with 5 or more male sex partners, no condom use during anal intercourse, diagnosis of an STI, or having a sexual partner who was an HIV-positive man or TW. Potential participants were tested for HIV to identify HIV-negative individuals, who were then enrolled in a follow-up phase of the Sabes study with monthly visits to identify incident cases of HIV. Participants with acute or recent HIV identified during monthly follow-up visits were enrolled in a randomized study of immediate versus deferred ART, the results of which are reported elsewhere (Lama et al., 2018). Participants completed questionnaires at baseline about demographic and psychosocial characteristics, sexual behavior, and substance use. HIV-negative participants enrolled in the follow-up phase of the Sabes study returned monthly for HIV testing, and to complete questionnaires about sexual behavior, drug and alcohol use, and social venue attendance in the prior 30 days.

### Data Sources and Measures

Data were collected by computer-assisted self-interview (CASI), in Spanish, with study staff available to answer questions about the CASI during study visits. Data on demographic characteristics, sexual behavior, substance use, and social venue attendance were collected via a questionnaire administered at baseline. Alcohol use was measured at baseline using the Alcohol Use Disorders Identification Test (AUDIT), which asks about behaviors during the past year (Babor et al., 2001); participants were considered to have an alcohol use disorder (AUD) if their AUDIT score was 8 or higher (Ludford et al., 2013; Vagenas et al., 2013, 2015). Participants were categorized as having participated in transactional sex if they responded “yes” to either self-identifying as a sex worker or having received money or goods in exchange for sex in the prior 6 months.

Participants were asked about anal sex in the preceding 30 days with four types of male or TW partners: main (*pareja principal*), casual (*caserito*), one-time (*punto*), and clients. Main partners were defined as sexual partners the participant lived with, saw regularly, or towards whom they expressed affectionate feelings. A casual partner was someone with whom the participant had a sexual relationship but did not consider a main partner, while a one-time partner was defined as someone with whom the participant had sex only once. Clients were anyone who paid participants for sex. Participants indicated whether they had zero, one, or more than one of each type of partner, and whether they participated in CAI with each type of partner during the past 30 days. We created binary variables for analyses indicating, for

each type of partner, whether a participant had a partner of that type in the previous 30 days. Substance use during follow-up was assessed via a single question asking participants to indicate which substances (alcohol, marijuana, cocaine, ketamine, amphetamines, poppers, ecstasy, or other drugs) they had consumed in the prior 30 days. We created binary variables for analyses indicating whether participants had consumed alcohol or used any drug during the prior 30 days. Participants also indicated whether they had met sexual partners in the past 30 days at any of 17 specific social venues popular among MSM and TW in Lima. For analysis, we created a binary variable to indicate whether participants met any sexual partners at a social venue in the prior 30 days.

### Statistical Analysis

Participants were included in this analysis if they answered at least one demographic question and answered sexual behavior questions about CAI with at least one type of partner. Follow-up observations were excluded if they occurred 14 days or fewer from the prior observation. Descriptive statistics for demographic characteristics, sexual behavior, and substance use behavior collected at baseline were tabulated for all participants included in the analysis. For type of partner and CAI with each type of partner, we describe the proportion of follow-up visits where a given partner type or behavior was observed and the proportion of participants who ever reported that partner type or behavior during follow-up.

We conducted two separate analyses to identify correlates of being in each of four types of partnerships, and to identify correlates of CAI among participants reporting each type of partnership. We used generalized estimating equations (GEE) to first identify correlates of reporting each type of partner, and then to identify correlates of CAI with each type of partner. We used a logit link functions and exchangeable correlation structures with robust standard errors to estimate odds ratios for bivariate associations between covariates of interest and outcomes (type of partner or CAI with each type of partner). Separate bivariate and multivariate models were developed for each type of partner, and for CAI with each type of partner. Participants were excluded from individual models if they did not respond to questions about covariates and outcomes of interest at any time point. To generate multivariate models for each outcome, covariates with  $p < 0.1$  in bivariate analysis were initially included. Independent variables were then removed using a step-wise approach beginning with the variable with the highest  $p$  value. The quasi-information criteria (QIC) was then assessed for each reduced model and the final multivariate model was chosen based on the lowest QIC (Pan, 2001). Analysis of correlates of CAI with each partner type were limited to participants who reported that type of partner.

This study was approved by the Fred Hutchinson Cancer Research Center, Asociación Civil Impacta Salud y Educación, and Asociación Vía Libre institutional review boards. All analyses were conducted using Stata 14.1 (College Station, TX).

## RESULTS

A total of 1,831 participants contributed data from 14,792 study visits to this analysis. Most participants had completed secondary or higher education, identified as homosexual, and screened positive for an AUD; half earned at or above minimum wage (750 soles; ~262

USD/month) (Table 1). Main partnerships were most common, and were reported by 1,661 participants (90.7%) during the study period. Main partnerships were reported at 9,108 visits (61.6%). Casual partnerships were reported by 1,515 participants (82.7%), at 7,034 visits (47.6%). One-time partnerships were reported by 1,487 participants (81.2%), at 6,711 visits (45.4%). Clients were least common, and were reported by 672 participants (36.7%), at 2,412 visits (16.3%).

CAI was most commonly reported with main partners: among participants who indicated that they had a main partner, 1,121 (67.5%) reported having CAI with that partner during the study period. CAI with a main partner was reported at 3,350 visits (36.8% of all visits where a main partner was reported). CAI with casual partners was reported by 876 participants (57.8%), at 2,106 visits (29.9%). CAI with one-time partners was reported by 750 participants (50.4%) at 1,687 visits (25.1%), and CAI with clients was reported by 280 participants (41.7%) at 699 visits (29.0%). Proportion of visits with CAI varied significantly by partner type ( $p < 0.001$ ).

In bivariate analyses, older age, higher income, alcohol use, drug use, or meeting a partner at a social venue (e.g. bars, clubs) in the past 30 days were associated with higher odds of being in a main partnership (Table 2). Higher income was associated with lower odds of being in casual, one-time, and client partnerships. Older age, presence of an AUD at baseline, reporting a female sex partner at baseline, alcohol use, drug use, and meeting a partner at a venue in the past 30 days were associated with higher odds of being in casual, one-time, and client partnerships. Additionally, having a main partner was associated with lower odds of being with both casual and one-time partners, but not clients. In final multivariate models for each type of partner, reporting a female sex partner at baseline was associated with lower odds of being in a main partnership but higher odds of being with a client (Table 3). Drug use and meeting a partner at a social venue in the past 30 days were both associated with higher odds of reporting all types of partners. Presence of an AUD at baseline was not associated with any type of partner, although alcohol use in the prior 30 days was associated with increased odds of reporting casual partners, one-time partners, and clients

In bivariate analyses, older age was associated with lower odds of CAI with main and casual partners (Table 4). Engaging in transactional sex, having an AUD, using drugs in the past 30 days, and meeting a sex partner at a social venue in the prior 30 days were associated with increased odds of CAI with all types of partners. Alcohol use in the prior 30 days was associated with increased odds of CAI within main partnerships, but not with any other type of partner. In multivariate models, older age was associated with decreased odds of CAI with main partners and casual partners, but not one-time partners or clients (Table 5). Reporting transactional sex at baseline was associated with increased odds of CAI with all types of partners except casual partners. Baseline presence of an AUD and meeting a sex partner at a venue in the prior 30 days were associated with increased odds of CAI with all types of partners. Reporting any alcohol use in the prior 30 days was associated with increased odds of CAI only within main partnerships. Having one main partner in the prior 30 days was associated with decreased odds of CAI with all types of partners. Supplementary tables

include results of models using categorical (none, one, more than one) variables for presence of main partnership in the prior 30 days (Supplementary Tables 1 & 2).

## DISCUSSION

In summary, main, casual, and one-time partners were reported by the majority of study participants, and CAI was most commonly reported with main partners. In multivariate analyses, correlates of reporting each type of partner differed somewhat by type of partner. However, some characteristics, such as drug use in the prior 30 days, alcohol use in the prior 30 days, and meeting sexual partners at social venues were associated with increased odds of being in most types of partnerships. Reporting a single main partner was associated with decreased odds of reporting other types of partners, and presence of an AUD at baseline was not associated with being in any type of partnership. Presence of an AUD was associated with increased odds of CAI within all types of partnerships, while recent alcohol use was only associated with increased odds of CAI with main partners. Participants who reported having a single main partner had decreased odds of CAI with all types of partners.

Our finding that CAI was most commonly reported in main partnerships is consistent with prior studies in this population (Cambou et al., 2014; Delgado et al., 2017). We hypothesized that individuals with one main partner might be less likely to form other partnerships or have CAI in those partnerships, associations that have been suggested by others (Hoff et al., 2012, 2016; Hoff & Beougher, 2010). For the most part, our findings support this hypothesis, as individuals with one main partner had decreased odds of being in casual and one-time partnerships and of having CAI with all types of partners compared to individuals without one main partner. Our finding that having one main partner is associated with lower odds of CAI with other types of partners further supports findings from a recent study of concurrent sexual partnerships among MSM and TW in Peru. That study reported that the majority of participants who had concurrent stable and non-stable partners either used condoms with both partners or preferentially had CAI only with the stable partner (Ulrich et al., 2019). Notably, sex with a client was not less likely among individuals with one main partner. This could indicate that there is a group of individuals in our study population whose primary source of income is sex work, and therefore their likelihood of being with clients is unlikely to change regardless of whether they have a main partner, consistent with what has been reported in other studies (Bayer et al., 2014a, 2014b; Nureña et al., 2011).

Our finding that individuals with an AUD had higher odds of CAI with all types of partners is inconsistent with some prior research among Peruvian MSM and TW, which found AUDs were not associated with CAI (Herrera et al., 2016). However, our larger population and repeated measures may have contributed to an increased ability of our study to observe differences in CAI associated with presence of an AUD. Indeed, another study examining associations between AUDs and behaviors associated with increased risk of HIV transmission among over 5000 Peruvian MSM found that AUDs were associated with increased odds of CAI at last sexual encounter [adjusted odds ratio = 1.22; (1.09–1.38)] (Ludford et al., 2013). Somewhat surprisingly, recent alcohol use dropped out of most of our multivariate models and was only found to be associated with increased odds of CAI in main partnerships. The differing associations between AUD and CAI versus recent alcohol



use and CAI may be the result of differences in the type of drinking behavior captured by each variable. The AUDIT is intended to capture patterns of risky quantity or frequency of drinking, while the single question about any consumption of alcohol during the prior 30 days used in follow-up questionnaires is less likely to capture patterns of drinking behavior.

This analysis should be interpreted with the following limitations in mind. First, it included only HIV-negative MSM and TW who met study-specific criteria for high risk of HIV acquisition, and are not a representative sample of MSM and TW in Lima. Our results are therefore unlikely to be generalizable to the larger MSM and TW populations. Second, all data were collected by self-report and were likely subject to some degree of social desirability bias. Data were collected by computer in order to mitigate this source of bias, but it is possible that some participants underreported behavior that could be viewed as potentially stigmatizing or undesirable. Third, we included gender identity as a covariate in our models in order to compare MSM to TW study participants while adjusting for other covariates. However, some differences between these unique populations may have remained unmeasured. Fourth, questionnaire items on recent alcohol and drug use asked about any recent substance use, but did not include questions about substance use in the context of meeting partners or sexual activity. Situational measures of substance use should be considered in future surveys to more precisely capture the relationship between substance use and sexual behavior. Finally, numerical data on number of alcoholic drinks consumed, number of partners of each type, and number of acts of CAI were not collected for analysis. Future surveys should attempt to collect this data to permit dose-response analysis between substance use and sexual behavior indicators.

The primary strength of this study is its large sample size and repeated observations that collected detailed data on being in different types of partnership and CAI with each type of partner. This enabled us to stratify our analysis by type of partner and obtain a more granular view of CAI within each type of partnership, in contrast to previous studies. By separating the existence of a partnership from CAI within that partnership, this analysis was able to pinpoint factors associated with forming partnerships and with CAI within partnerships. Future studies should control for partnership status to ensure that analytical results accurately capture the effects of predictors on CAI risk alone. Additionally, this analysis shows that predictors of sexual behavior vary by type of partner, reinforcing the need for a more nuanced view of this aspect of sexual behavior in future analyses and interventions. Future prospective analyses are needed to better elucidate sexual network structures and dose-response relationships between substance use and sexual behavior, with care paid to controlling for or limiting analysis to only individuals in partnerships of interest.

This analysis points to several areas of potential intervention to reduce HIV transmission among MSM and TW in Lima, in particular substance use and meeting sexual partners at social venues. It reinforces the need for screening for AUDs among individuals at high risk for HIV acquisition. Given that social venue attendance was associated with significantly higher odds of being in all types of partnerships, and with higher odds of CAI within those partnerships, interventions and outreach efforts placed within these venues may have a meaningful impact. Additionally, interventions to reduce HIV transmission may be strengthened by the inclusion of alternate prevention strategies to condom use, such as

pre- and post-exposure prophylaxis. Finally, any future HIV prevention efforts should take the socio-legal context for MSM and TW communities into account in order to design interventions that can effectively and safely reach target populations.

## Supplementary Material

Refer to Web version on PubMed Central for supplementary material.

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**Table 1.**

Baseline characteristics of study population

	Total Study Sample (N = 1,831)	
	No.	%
<b>Number of Follow-up Visits</b>		
Median, IQR	6	3–9
<b>Days between Visits</b>		
Med, IQR	34	28–49
<b>Days of Follow-up</b>		
Med, IQR	374	222–538
<b>Age</b>		
<22	453	24.7%
22 – <26	436	23.8%
26 – <33	482	26.3%
33	460	25.1%
<b>Education</b>		
Less than Secondary	207	11.3%
Completed Secondary	447	24.4%
Any post-secondary	1,177	64.3%
<b>Income</b>		
No Monthly Income	356	19.4%
Monthly income less than min wage <sup>a</sup>	516	28.2%
Monthly income at or above min wage <sup>a</sup>	959	52.4%
<b>Sexual Orientation / Gender Identity<sup>b</sup></b>		
Trans	257	14.0%
Homosexual	953	52.1%
Bisexual	554	30.3%
Heterosexual	66	3.6%
<b>Female Sexual Partner in Past 3 months<sup>b</sup></b>		
No	1,495	81.7%
Yes	335	18.3%
<b>Sexual role<sup>b</sup></b>		
Insertive	492	26.9%
Receptive	534	29.2%
Versatile	804	43.9%
<b>Transactional Sex<sup>b</sup></b>		
No	1,183	64.80%
Yes	644	35.20%
<b>Alcohol Use Disorder<sup>b</sup></b>		

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	<b>Total Study Sample (N = 1,831)</b>	
	<b>No.</b>	<b>%</b>
No	873	47.8%
Yes	954	52.2%

<sup>a</sup> Monthly minimum wage = 750 soles

<sup>b</sup> Sum does not total 1,831 due to missing responses

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**Table 2.**

Bivariate correlates of being in each of four different partnership types among MSM and TW at high risk of HIV acquisition, Lima, Peru

	Being with a Main Partner OR	Being with a Casual Partner OR	Being with a One-Time Partner OR	Being with a Client OR
<b>Age</b>				
<22	Ref	Ref	Ref	Ref
22 – <26	1.01	1.18	1.22 <sup>a</sup>	1.24
26 – <33	1.17	1.26 <sup>b</sup>	1.27 <sup>b</sup>	1.47 <sup>b</sup>
33	1.22 <sup>a</sup>	1.53 <sup>c</sup>	1.15	1.32 <sup>a</sup>
<b>Education</b>				
Less than Secondary	Ref	Ref	Ref	Ref
Completed Secondary	0.98	0.74 <sup>b</sup>	0.81 <sup>a</sup>	0.53 <sup>c</sup>
Any post-secondary	1.17	0.73 <sup>c</sup>	0.75 <sup>b</sup>	0.22 <sup>c</sup>
<b>Income</b>				
No Monthly Income	Ref	Ref	Ref	Ref
Monthly income less than min wage	1.15	1.22 <sup>a</sup>	1.19 <sup>a</sup>	1.22
Monthly income at or above min wage	1.34 <sup>c</sup>	1.16	1.09	0.70 <sup>b</sup>
<b>Sexual Orientation/Gender Identity</b>				
Trans	0.99	1.45 <sup>c</sup>	1.43 <sup>c</sup>	8.25 <sup>c</sup>
Homosexual	Ref	Ref	Ref	Ref
Bisexual	0.96	0.94	1.04	1.55 <sup>c</sup>
Heterosexual	0.74	1.02	1	3.12 <sup>c</sup>
<b>Female Sex Partner in Past 3 Months<sup>d</sup></b>				
Yes vs No (reference)	0.86	1.18 <sup>a</sup>	1.18 <sup>a</sup>	1.61 <sup>c</sup>
<b>Sexual Role</b>				
Insertive	Ref	Ref	Ref	Ref
Receptive	1.06	1.23 <sup>a</sup>	1.08	1.50 <sup>c</sup>
Versatile	1.18 <sup>a</sup>	1.02	1.03	0.65 <sup>c</sup>
<b>Transactional Sex<sup>d</sup></b>				
Yes vs No (reference)	0.93	1.74 <sup>c</sup>	1.67 <sup>c</sup>	8.04 <sup>c</sup>
<b>AUD<sup>d</sup></b>				
Yes vs No (reference)	1.01	1.30 <sup>c</sup>	1.33 <sup>c</sup>	2.04 <sup>c</sup>
<b>Alcohol Use in Prior 30 days</b>				
Yes vs No (reference)	1.09 <sup>a</sup>	1.72 <sup>c</sup>	1.53 <sup>c</sup>	1.40 <sup>c</sup>
<b>Drug Use in Prior 30 Days</b>				

	Being with a Main Partner	Being with a Casual Partner	Being with a One-Time Partner	Being with a Client
	OR	OR	OR	OR
Yes vs No (reference)	1.58 <sup>c</sup>	1.98 <sup>c</sup>	2.09 <sup>c</sup>	1.97 <sup>c</sup>
<b>Met Sex Partner at a Social Venue in Last 30 Days</b>				
Yes vs No (reference)	1.75 <sup>c</sup>	3.80 <sup>c</sup>	5.41 <sup>c</sup>	2.63 <sup>c</sup>
<b>One Main Partner in Prior 30 Days</b>				
Yes vs No (Reference)		0.57 <sup>c</sup>	0.53 <sup>c</sup>	0.92

<sup>a</sup> p<0.05.

<sup>b</sup> p<0.01

<sup>c</sup> p<0.001

<sup>d</sup> The following variables were only collected at baseline: female sex partner in prior 3 months, transactional sex, AUD

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**Table 3.**

Multivariate correlates of being in each of four different partnership types among MSM and TW at high risk of HIV acquisition, Lima, Peru

	Being in a Main Partnership		Being in a Casual Partnership		Being in a One-Time Partnership		Being with a Client	
	aOR	95% CI	aOR	95% CI	aOR	95% CI	aOR	95% CI
<b>Age</b>								
<22			Ref				Ref	
22 – <26			1.09	0.92,1.29			1.22	0.91,1.63
26 – <33			<b>1.20<sup>a</sup></b>	<b>1.02,1.42</b>			<b>1.43<sup>a</sup></b>	<b>1.08,1.89</b>
33			<b>1.52<sup>c</sup></b>	<b>1.29,1.79</b>			1.32	0.99,1.76
<b>Education</b>								
Less than Secondary			Ref				Ref	
Completed Secondary			0.87	0.72,1.06			0.77	0.58,1.03
Any post-secondary			0.97	0.81,1.16			<b>0.48<sup>c</sup></b>	<b>0.36,0.63</b>
<b>Income</b>								
No Monthly Income	Ref				Ref			
Monthly income less than min wage	1.14	0.96,1.37			<b>1.18<sup>a</sup></b>	<b>1.01,1.39</b>		
Monthly income at or above min wage	<b>1.34<sup>c</sup></b>	<b>1.13,1.58</b>			1.13	0.98,1.31		
<b>Sexual Orientation / Gender Identity</b>								
Trans			1.17	0.98,1.40	<b>1.25<sup>a</sup></b>	<b>1.05,1.49</b>	<b>4.21<sup>c</sup></b>	<b>3.20,5.56</b>
Homosexual			Ref		Ref		Ref	
Bisexual			0.96	0.82,1.13	1.02	0.89,1.17	<b>1.35<sup>a</sup></b>	<b>1.02,1.78</b>
Heterosexual			0.96	0.66,1.40	0.88	0.64,1.22	<b>2.15<sup>c</sup></b>	<b>1.37,3.37</b>
<b>Female Sex Partner in Past 3 Months<sup>d</sup></b>								
Yes vs No (Reference)	<b>0.82<sup>a</sup></b>	<b>0.70,0.96</b>	1.13	0.94,1.35			<b>1.34<sup>a</sup></b>	<b>1.01,1.78</b>
<b>Sexual Role</b>								
Insertive			Ref				Ref	
Receptive			<b>1.27<sup>a</sup></b>	<b>1.05,1.53</b>			<b>1.39<sup>a</sup></b>	<b>1.02,1.89</b>
Versatile			1.06	0.90,1.25			0.92	0.71,1.19
<b>Transactional Sex<sup>d</sup></b>								
Yes vs No (Reference)			<b>1.43<sup>c</sup></b>	<b>1.25,1.63</b>	<b>1.39<sup>c</sup></b>	<b>1.23,1.57</b>	<b>4.92<sup>c</sup></b>	<b>3.98,6.08</b>
<b>AUD<sup>d</sup></b>								
Yes vs No (Reference)			0.92	0.81,1.04				
<b>Alcohol Use in Prior 30 Days</b>								
Yes vs No (Reference)			<b>1.61<sup>c</sup></b>	<b>1.48,1.74</b>	<b>1.37<sup>c</sup></b>	<b>1.27,1.49</b>	<b>1.27<sup>c</sup></b>	<b>1.13,1.42</b>



	Being in a Main Partnership		Being in a Casual Partnership		Being in a One-Time Partnership		Being with a Client	
	aOR	95% CI	aOR	95% CI	aOR	95% CI	aOR	95% CI
<b>Drug Use in Prior 30 Days</b>								
Yes vs No (Reference)	1.49 <sup>c</sup>	1.27,1.75	1.70 <sup>c</sup>	1.44,2.00	1.76 <sup>c</sup>	1.50,2.07	1.99 <sup>c</sup>	1.63,2.42
<b>Met Sex Partner at a Social Venue in Prior 30 Days</b>								
Yes vs No (Reference)	1.72 <sup>c</sup>	1.53,1.94	3.66 <sup>c</sup>	3.25,4.11	5.27 <sup>c</sup>	4.68,5.94	3.33 <sup>c</sup>	2.91,3.81
<b>One Main Partner in Prior 30 Days</b>								
Yes vs No (Reference)			0.55 <sup>c</sup>	0.51,0.60	0.50 <sup>c</sup>	0.46,0.55	0.9	0.81,1.01

<sup>a</sup> p<0.05.

<sup>b</sup> p<0.01

<sup>c</sup> p<0.001

<sup>d</sup> The following variables were only collected at baseline: female sex partner in prior 3 months, transactional sex, AUD Blank cells indicate that a variable was not included in the final model for that type of partner after model selection

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**Table 4.**

Bivariate correlates of CAI among MSM and TW at high risk for HIV acquisition, stratified by sexual partnership type, Lima, Peru

	Main Partner OR	Casual Partner OR	One-Time Partner OR	Client OR
<b>Age</b>				
<22	Ref	Ref	Ref	Ref
22 – <26	0.86	0.85	0.9	1.01
26 – <33	0.87	0.87	0.89	0.82
33	<b>0.72<sup>b</sup></b>	<b>0.75<sup>b</sup></b>	0.89	0.71
<b>Education</b>				
Less than Secondary	Ref	Ref	Ref	Ref
Completed Secondary	0.92	1.05	1.09	0.77
Any post-secondary	<b>0.77<sup>a</sup></b>	0.98	0.92	0.76
<b>Income</b>				
No Monthly Income	Ref	Ref	Ref	Ref
Monthly income less than min wage	1.22	1.11	1.14	0.93
Monthly income at or above min wage	1.19	1.12	1.07	0.98
<b>Sexual Orientation/ Gender Identity</b>				
Trans	<b>1.59<sup>c</sup></b>	<b>1.27<sup>a</sup></b>	<b>1.28<sup>a</sup></b>	1.17
Homosexual	Ref	Ref	Ref	Ref
Bisexual	1.08	1	1.04	0.84
Heterosexual	0.76	0.9	0.95	0.87
<b>Female Sex Partner in Prior 3 Months<sup>d</sup></b>				
Yes vs No (reference)	1.16	1.06	1.14	1.07
<b>Sexual Role</b>				
Insertive	Ref	Ref	Ref	Ref
Receptive	<b>1.21<sup>a</sup></b>	<b>1.23<sup>a</sup></b>	<b>1.28<sup>a</sup></b>	1.22
Versatile	1.1	<b>1.24<sup>a</sup></b>	<b>1.24<sup>a</sup></b>	1.43
<b>Transactional Sex<sup>d</sup></b>				
Yes vs No (reference)	<b>1.74<sup>c</sup></b>	<b>1.32<sup>c</sup></b>	<b>1.33<sup>c</sup></b>	<b>1.56<sup>b</sup></b>
<b>AUD<sup>d</sup></b>				
Yes vs No (reference)	<b>1.60<sup>c</sup></b>	<b>1.60<sup>c</sup></b>	<b>1.57<sup>c</sup></b>	<b>1.71<sup>c</sup></b>
<b>Alcohol Use in Prior 30 days</b>				
Yes vs No (reference)	<b>1.25<sup>c</sup></b>	1.06	0.97	1.03
<b>Drug Use in Prior 30 Days</b>				
Yes vs No (reference)	<b>1.36<sup>b</sup></b>	<b>1.48<sup>c</sup></b>	<b>1.39<sup>b</sup></b>	<b>1.58<sup>b</sup></b>
<b>Met Sex Partner at a Social Venue in Last 30 Days</b>				

	Main Partner OR	Casual Partner OR	One-Time Partner OR	Client OR
Yes vs No (Reference)	1.46 <sup>c</sup>	1.70 <sup>c</sup>	1.51 <sup>c</sup>	1.70 <sup>c</sup>
<b>One Main Partner in Past 30 Days</b>				
Yes vs No (Reference)	0.50 <sup>c</sup>	0.69 <sup>c</sup>	0.66 <sup>c</sup>	0.54 <sup>c</sup>

<sup>a</sup> p < 0.05.

<sup>b</sup> p < 0.01

<sup>c</sup> p < 0.001

<sup>d</sup> The following variables were only collected at baseline: female sex partner in prior 3 months, transactional sex, AUD

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**Table 5.**

Multivariate correlates of CAI among MSM and TW at high risk for HIV acquisition, stratified by sexual partnership type, Lima, Peru

	Main Partner		Casual Partner		One-Time Partner		Client	
	aOR	95% CI	aOR	95% CI	aOR	95% CI	aOR	95% CI
<b>Age</b>								
<22	Ref		Ref					
22 – <26	<b>0.76<sup>b</sup></b>	<b>0.61,0.93</b>	0.83	0.67,1.05				
26 – <33	<b>0.72<sup>b</sup></b>	<b>0.59,0.89</b>	0.85	0.68,1.06				
33	<b>0.58<sup>c</sup></b>	<b>0.46,0.71</b>	<b>0.72<sup>b</sup></b>	<b>0.58,0.90</b>				
<b>Income</b>								
No Monthly Income	Ref							
Monthly income less than min wage	<b>1.24<sup>a</sup></b>	<b>1.01,1.53</b>						
Monthly income at or above min wage	<b>1.44<sup>c</sup></b>	<b>1.17,1.76</b>						
<b>Sexual Orientation / Gender Identity</b>								
Trans	<b>1.36<sup>b</sup></b>	<b>1.09,1.70</b>	1.15	0.91,1.45				
Homosexual	Ref		Ref					
Bisexual	1.06	0.88,1.27	1.03	0.84,1.27				
Heterosexual	0.75	0.47,1.19	0.94	0.58,1.54				
<b>Female Sex Partner in Prior 3 Months<sup>d</sup></b>								
Yes vs No (reference)								
<b>Sexual Role</b>								
Insertive	Ref		Ref		Ref		Ref	
Receptive	1.11	0.88,1.38	1.27	0.99,1.63	<b>1.32<sup>a</sup></b>	<b>1.05,1.65</b>	<b>1.49<sup>a</sup></b>	<b>1.04,2.13</b>
Versatile	1.08	0.89,1.30	<b>1.24<sup>a</sup></b>	<b>1.01,1.54</b>	<b>1.25<sup>a</sup></b>	<b>1.01,1.54</b>	<b>1.61<sup>a</sup></b>	<b>1.11,2.34</b>
<b>Transactional Sex<sup>d</sup></b>								
Yes vs No (Reference)	<b>1.45<sup>c</sup></b>	<b>1.24,1.69</b>	1.14	0.97,1.35	<b>1.20<sup>a</sup></b>	<b>1.01,1.43</b>	<b>1.42<sup>a</sup></b>	<b>1.02,1.99</b>
<b>AUD<sup>d</sup></b>								
Yes vs No (Reference)	<b>1.36<sup>c</sup></b>	<b>1.17,1.57</b>	<b>1.44<sup>c</sup></b>	<b>1.23,1.69</b>	<b>1.43<sup>c</sup></b>	<b>1.20,1.69</b>	<b>1.50<sup>a</sup></b>	<b>1.10,2.05</b>
<b>Alcohol Use in Last 30 Days</b>								
Yes vs No (Reference)	<b>1.15<sup>b</sup></b>	<b>1.04,1.28</b>						
<b>Drug Use in Last 30 Days</b>								
Yes vs No (Reference)	1.12	0.93,1.35	<b>1.30<sup>a</sup></b>	<b>1.06,1.60</b>	<b>1.25<sup>a</sup></b>	<b>1.02,1.54</b>	1.35	1.00,1.83
<b>Met a Sex Partner at Social Venue in Past 30 Days</b>								
Yes vs No (Reference)	<b>1.21<sup>b</sup></b>	<b>1.06,1.39</b>	<b>1.67<sup>c</sup></b>	<b>1.48,1.89</b>	<b>1.47<sup>c</sup></b>	<b>1.29,1.68</b>	<b>1.61<sup>c</sup></b>	<b>1.29,2.02</b>
<b>One Main Partner in Past 30 Days</b>								
Yes vs No (Reference)	<b>0.52<sup>c</sup></b>	<b>0.46,0.58</b>	<b>0.67<sup>c</sup></b>	<b>0.60,0.76</b>	<b>0.65<sup>c</sup></b>	<b>0.57,0.74</b>	<b>0.55<sup>c</sup></b>	<b>0.44,0.68</b>

<sup>a</sup>  
p < 0.05.

<sup>b</sup>  
p < 0.01

<sup>c</sup>  
p < 0.001

<sup>d</sup>The following variables were only collected at baseline: female sex partner in prior 3 months, transactional sex, AUD. Blank cells indicate that a variable was not included in the final model for that type of partner after model selection.

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