



Getting Clear About Rectal Douching Among Men Who Have Sex With Men

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Abstract

Receptive anal sex is the primary means through which HIV is transmitted among men who have sex with men (MSM). Recently, researchers have begun investigating the role that rectal douching may play in amplifying risk for transmission. Yet, there is limited research on the frequency with which MSM douche, the products they use, and how this may vary across sociodemographic characteristics. A U.S. national sample of 4745 MSM completed an online survey that assessed their douching behavior, demographic characteristics, sexual behavior, and their anal sexual positioning (i.e., top, bottom, versatile). Nearly two-thirds (65.8%) had engaged in rectal douching in the last three months. Among those who douched, water was commonly reported (84.2%) and 20.1% reported using commercial enemas (e.g., Fleet), as well as water and soap (15.0%)—numbers exceed 100% as some participants reported more than one. Men who douched reported significantly more receptive and insertive condomless anal sex acts in the prior 3 months. One-in-ten men reported rectal bleeding after douching. Compared to HIV-negative participants who had not taken PrEP, participants had higher odds of reporting douching in the past 3 months if they were HIV-negative and currently on PrEP (AOR = 1.82), HIV-negative and previously used PrEP (AOR = 1.58), and HIV-positive (AOR = 1.83). Douching was common in this sample. Given that douching could amplify risk for HIV transmission, healthcare providers should discuss douching safety with their patients, with a focus on harm reduction (e.g., reduce risk of bleeding, as opposed to abstinence from douching).

Keywords Rectal douching · Men who have sex with men · Anal sexual role · HIV risk · Sexual orientation

Introduction

Anal sex is commonly practiced among men who have sex with men (MSM). In Europe, a transcontinental survey of MSM reported that 88.5% engaged in anal sex in the past 6 months (Sherriff et al. 2020). Meanwhile, a surveillance study of MSM in 16 U.S. states reported that 57% had anal

sex with at least one partner in the prior 90 days (Noor & Rosser, 2014). Within MSM communities, men have adopted labels to describe their preferred anal sexual role. In the U.S., this language includes “top,” to mean the insertive partner, and “bottom” to mean the receptive partner (Wei & Raymond, 2011). Those who engage in both insertive and receptive sex use labels such as “versatile,” “versatile top,” and “versatile bottom”—the latter two to mean a preference toward topping or bottoming, respectively. In other countries, terms like “active” and “passive” are used in place of “top” and “bottom,” respectively. Studies have noted that between 8 and 37% of MSM identify as top, 13–50% as bottom, and 47–58% as versatile (Dangerfield, Ober, Smith, Shoptaw, & Bluthenthal, 2018a; Dangerfield et al., 2018b; Dangerfield, Smith, Williams, Unger, & Bluthenthal, 2017; Hart et al., 2003; Klein, 2009; Lick & Johnson, 2015; Moskowitz & Hart, 2011; Moskowitz, Rieger, & Roloff, 2008; Noor & Rosser, 2014; Van Tieu et al., 2013; Wei & Raymond, 2011), although identity labels themselves may shift over time (Pachankis, Battenwieser, Bernstein, & Bayles, 2013).

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Receptive anal sex also happens to be the primary method through which HIV is transmitted among MSM. The CDC reported that, by 2017, 72% of HIV infections among males were attributed to male-to-male sexual contact (CDC, 2019). To reduce the risk for HIV, MSM have been known to use sexual positioning, a term described as “strategic positioning” (i.e., topping = less risk; bottoming = higher risk) (Parsons et al., 2005; Van de Ven et al., 2002). It is thought that seminal fluid containing HIV, as well as microtears in both the rectum and the penis, are how HIV is passed between partners. There has also been a growing body of research to analyze other biological mechanisms through which vulnerability to HIV is amplified in the rectal environment (Kelley et al., 2017), including an association between MSM gut microbiota and HIV infection (Noguera-Julian et al., 2016).

Rectal douching, which may alter aspects of columnar rectum epithelium, may serve as pathway to amplify pathogen transmission risk between partners (Carballo-Diéguez et al., 2008; Javanbakht, Stahlman, Pickett, LeBlanc, & Gorbach, 2014; Kelley et al., 2017; Leyva et al., 2013; McGaugh et al., 2019). Rectal douching involves inserting a liquid, typically water or commercially available douching products (e.g., Fleet Enema), into the rectum to flush out fecal matter in preparation for receptive anal sex, or as a means to clean after anal sex (Carballo-Diéguez, Bauermeister, Ventuneac, Dolezal, & Mayer, 2010; Carballo-Diéguez et al., 2008; Carballo-Diéguez, Lentz, Giguere, Fuchs, & Hendrix, 2018; Hambrick et al., 2018). One study reported that as many as 87% of MSM in a large U.S. sample have reported ever practicing douching (Noor & Rosser, 2014). Another study with HIV-negative MSM noted that half (53%) douched before sex, and one-fourth (27%) douched after sex (Carballo-Diéguez et al., 2008). With limited exceptions (Carballo-Diéguez et al., 2018), the literature on the frequency of douching as well as the types of products used is relatively scant compared to that on, for example, condomless anal sex. Acknowledging the diversity of rectal douching practices is important as there is evidence to suggest that some douches (e.g., isoosmolar douches) may be less harmful to the rectal epithelium than others (e.g., hyperosmolar or hypoosmolar enemas) (Leyva et al., 2013). Similarly, the type of rectal douche device used (e.g., enema, bulb, or hose) and fluid used (e.g., water, soapy water, or saline solution) may result in differential risk of inflammation, epithelial sloughing, and microtearing.

Given the emerging focus on douching as a factor that could be associated with HIV infection, we sought to investigate the prevalence of douching behavior in an ongoing large U.S. national cohort of MSM. In addition to examining the prevalence of douching, we also examined the frequency, devices used to douche, and fluids used, how douching itself may be related to the labels individuals used to describe their anal

sexual roles, and HIV status and PrEP use. Our goal was to provide a more comprehensive evaluation of the douching practices of MSM and thus inform future research examining links between douching and health outcomes.

Method

Participants

Data were taken from *Together 5000* (herein T5K), a U.S. national, internet-based cohort study of cisgender men, transgender men, and transgender women who have sex with men. The goal of T5K is to identify modifiable individual and structural factors associated with HIV risk and PrEP uptake. Enrollment occurred between October 2017 and June 2018 using ads on men-for-men geosocial networking phone applications (apps). The cohort and study procedures have been fully described elsewhere (Groves et al., 2019a, 2020; Nash et al., 2019). Briefly, core eligibility criteria for enrollment specified that participants were aged 16–49; had at least two male sex partners in the past three months; were not currently participating in an HIV vaccine or PrEP clinical trial; were not currently on PrEP; lived in the U.S. or its territories; were not known to be HIV positive; had a gender identity other than cisgender female; and reported behavioral risk for HIV.

Participants clicking on one of our study ads were routed from geosocial apps to a secured informed consent and enrollment survey. Of those who completed the enrollment survey, 8754 participants met eligibility and provided contact information for later follow-up. These participants were sent a link to complete a longer second survey. Of the 8754 eligible, 6266 (71.6%) completed the secondary survey and received a \$15 incentive. These surveys collected data on demographic characteristics including age, sexual orientation, and how they identified sexually when it came to insertive or receptive anal sex (top, versatile top, versatile, versatile bottom, bottom, not applicable). For the purposes of these analyses, top and versatile top were combined as were bottom and versatile bottom (i.e., top/vers top, versatile, bottom/vers bottom).

Following completion of the secondary survey and for an additional \$15 incentive, participants were mailed an OraSure HIV-1 specimen collection device to use at home. Collection procedures involved taking an oral swab and placing it in an oral fluid container and mailing the specimen using provided prepaid shipping materials to the Wadsworth Center Laboratory of the New York State Department of Health for antibody testing (Avioq HIV-1 Microelisa System). HIV-positive results were delivered to participants via phone along with referrals to local clinics or other healthcare providers to link them to care following our clinical protocols. HIV-negative results were delivered to participants via e-mail.

Twelve months after enrollment, participants were invited via e-mail and text message to complete another online survey ($n = 5254$) as well as at-home HIV testing. Participants who tested HIV positive at baseline (i.e., prevalent cases) were not asked to test again. Furthermore, participants who told us on their month 12 survey that they were on PrEP (i.e., began PrEP), or that they had been diagnosed with HIV in the year that passed since baseline (i.e., diagnosed outside of the study) were not asked to complete testing with us at 12-month follow-up. Instead, participants on PrEP were asked to submit a digital photograph of their prescription bottle showing their name and date. Meanwhile, participants indicating they had been diagnosed with HIV between study assessments were asked to provide proof of status (i.e., photograph of documentation indicating HIV diagnosis). At 12 months, participants were compensated \$25 for completing the online survey as well as \$25 for completing HIV testing, or providing photograph proof of PrEP or HIV-positive diagnosis.

Measures

The month 12 survey included the core measures of interest for the present study regarding douching and sexual behavior. Participants were first presented with an opening statement to describe douching:

“Many people douche by using an enema, shower attachment (shower shot), anal douche bulb or other device to clean out their butt before or after receptive anal sex (when they bottom). We are interested in understanding when and how you may have douched in the last 3 months.”

Following this, they were asked to indicate if they had douched in the last 3 months (yes/no). Those indicating “no” skipped the follow-up questions. Those that had indicated recent douching were asked to indicate what device(s) they used (select all that apply): An enema bottle or rubber bulb; hose attached to a shower or a faucet; other. They were also asked to indicate what type of liquid they used (select all that apply): tap water only; tap water and soap; a commercial douche or enema (e.g., Fleet); other. Next, they were asked to indicate how long it took them to douche: fewer than 10 min; 10–30 min; between 30 min and one hour; or more than one hour. To indicate, in general, how many times they needed to clean out their butt before they felt ready for sex: range 1 (once) to 5 or more times. To indicate if they experienced any bleeding from their anus after douching (yes/no), and to indicate if they had taken any fiber supplements (e.g., Fibercon, Pure) to make it easier to douche (yes/no). Participants were also asked to indicate the number of times they had douched before having receptive anal sex, as well as the number of times they douched after having engaged in receptive anal sex. All questions were time-bound to the prior 3 months.

For all results, we report on participants for which we had valid responses at baseline and month 12 ($n = 4745$). The study was designed with cisgender men who have sex with men in mind; however, transgender participants were permitted to enroll, so long as they otherwise met criteria. For the purposes of these analyses, we excluded transgender and gender non-binary participants ($n = 223$), many of whom told us that these particular sets of questions seemed not applicable to them or lacked sufficient nuance (e.g., that labels such as top, versatile, and bottom did not apply to them).

Analysis Plan

We used descriptive statistics—e.g., frequencies, percentages, means, and SDs—to describe the patterns of prevalence and incidence of douching and douching-related behavior among our geographically diverse participants. We also examined prevalence and incidence of douching use by various sociodemographic characteristics and sexual health factors.

Based on findings from these bivariate analyses ($p < .05$) and known factors associated with both HIV and douching from the literature (Carballo-Diéguez et al., 2018), we conducted a multivariable logistic regression analysis to determine the magnitude of the association of douching at 12-month follow-up with HIV and PrEP status at 12-month follow-up. We report adjusted odds ratios (AORs) and 95% confidence intervals (CIs) from this model. Among those who reported douching in the last 3 months ($n = 2811$), we also conducted multivariable Poisson analyses to determine the association of increased number of times douching both before and after having receptive anal intercourse with HIV seroconversion at 12-month follow-up. For these analyses, we report regression coefficients (β) and associated 95% CIs. All analyses were completed in SAS 9.4. Given our large sample size, and to avoid making Type 1 errors, we set p at .01 for statistical significance.

Results

Table 1 shows demographic characteristics and douching behavior in the prior 3 months. Nearly two-thirds (65.8%) of participants had engaged in rectal douching. Compared to those who had not douched, those who engaged in rectal douching were significantly more likely to identify as gay/queer/homosexual, to identify as a bottom/vers bottom, have engaged in sex work in the past year, as well as be on PrEP or HIV positive. Men who douched also reported significantly more receptive and insertive CAS acts in the prior 3 months. Douching was not associated with age, race or ethnicity, U.S. census region where participant resided.

Table 1 Demographic characteristics and rectal douching in the past three months in a U.S. national sample of cisgender men who have sex with men, 2018–2019, $N=4745$

	Total $n=4745$ Frequency (%)	Douching in the last 3 months		Chi-squared	p
		No $n=2131$ Frequency (%)	Yes $n=3124$ Frequency (%)		
Age at 12-month assessment					
17–24 years old	840 (17.7)	329 (17.0)	511 (18.2)	4.11	.25
25–35 years old	2475 (52.2)	995 (51.5)	1480 (52.7)		
36–45 years old	1074 (22.6)	451 (23.3)	623 (22.2)		
46–50 years old	356 (7.5)	159 (8.2)	197 (7.0)		
Race/ethnicity					
White	2555 (53.9)	1051 (54.3)	1504 (53.5)	10.53	.03
Black	471 (9.9)	217 (11.2)	254 (9.0)		
Latino	1141 (24.1)	447 (23.1)	694 (24.7)		
Asian/Pacific Islander	179 (3.8)	75 (3.9)	104 (3.7)		
Other or multiracial/ethnic	399 (8.4)	144 (7.5)	255 (9.1)		
Sexual orientation[‡]					
Gay, queer, homosexual	4081 (86.0)	1611 (83.3)	2470 (87.9)	24.17	<.0001
Bisexual	623 (13.1)	301 (15.6)	322 (11.5)		
Straight, heterosexual	6 (0.1)	1 (0.1)	5 (0.2)		
Other sexual identity	35 (0.7)	21 (1.1)	14 (0.5)		
Sex position					
Top/versatile top	1899 (40.0)	1148 (59.4)	751 (26.7)	531.89	<.0001
Versatile	959 (20.2)	316 (16.3)	643 (22.9)		
Bottom/versatile bottom	1887 (39.8)	470 (24.3)	1417 (50.4)		
US census region					
Northeast	720 (15.2)	296 (15.3)	424 (15.1)	9.40	.05
Midwest	729 (15.4)	316 (16.3)	413 (14.7)		
South	2202 (46.4)	908 (47.0)	1294 (46.0)		
West	1073 (22.6)	402 (20.8)	671 (23.9)		
US Territory or possession	21 (0.4)	12 (0.6)	9 (0.3)		
Marriage or civil union (at baseline)[‡]					
Yes	628 (13.2)	269 (13.9)	359 (12.8)	1.29	.26
No	4117 (86.8)	1665 (86.1)	2452 (87.2)		
Sex work (past 3 months)[‡]					
No, not in the last year	4141 (87.3)	1727 (89.3)	2414 (85.9)	12.27	.001
Yes, in the last year	604 (12.7)	207 (10.7)	397 (14.1)		
HIV status at 12-month follow-up[†]					
HIV negative, not on PrEP	3218 (69.1)	1432 (75.4)	1786 (64.8)	66.59	<.0001
HIV negative, currently on PrEP	741 (15.9)	239 (12.6)	502 (18.2)		
HIV negative, previously on PrEP	390 (8.4)	139 (7.3)	251 (9.1)		
HIV positive	264 (5.7)	72 (3.8)	192 (7.0)		
HIV unknown*	44 (0.9)	17 (0.9)	27 (1.0)		
	Mean (SD)	Mean (SD)	Mean (SD)	Poisson	
Receptive CAS acts (past 3 months)	4.7 (10.7)	2.3 (6.9)	6.1 (12.3)	3483.78	<.0001
Insertive CAS acts (past 3 months)	5.4 (14.6)	5.9 (14.4)	5.1 (14.7)	120.10	<.0001

[‡]Fisher's exact test

*HIV unknown status was due to laboratory inability to process samples (e.g., container opened in transit to lab)

[†] $n=88$ missing HIV status data at 12-month follow-up

Table 2 shows the association between anal sexual role (top/vers top, versatile, bottom/vers bottom) and varying douching practices, among those who had douched in the prior 3 months (valid $n = 2811$). Half (50.4%) of participants identified as bottoms/vers bottoms, 26.7% as tops/vers tops, and 22.9% as versatile. Participants most commonly douched with an enema bottle or rubber bulb (77.2%), followed by a hose attached to a faucet (34.2%). The majority used tap water (84.2%), followed by commercial products (e.g., Fleet, 20.1%), and tap water with soap (15.0%). Note that these numbers exceed 100% as some participants reported using more than one.

Nearly half (47.8%) of participants said it took them between 10 and 30 min to douche, and an additional third (34.0%) said it took them fewer than 10 min. In total, 28% of participants said it took them three times of flushing their rectum before they were ready for sex, 25.4% said two times, and 17.7% said five or more. Few (10.9%) reported bleeding from their rectum after douching, and just over a quarter (28.0%) said they also used fiber supplements to make it easier for them to douche. For the most part, douching practices were not significantly associated with sexual position identity, except that bottoms/vers bottoms reported a significantly greater number of times douching before and after having receptive anal sex.

Finally, Table 3 shows the results of three multivariable regressions (one logistic, two Poisson) to investigate factors associated with douching, as well as the number of times douched before and after anal sex. Compared to HIV-negative participants who had not taken PrEP, participants who were HIV negative and currently on PrEP (AOR = 1.82; 95% CI: 1.52–2.18), HIV-negative and previously used PrEP (AOR = 1.58; 95% CI: 1.25–1.99), and HIV-positive (AOR = 1.83; 95% CI: 1.36–2.46) had higher odds of reporting douching in the past 3 months. Additionally, participants who reported being a bottom/versatile bottom (AOR = 4.78; 95% CI: 4.14–5.52) or a versatile (AOR = 3.17; 95% CI: 2.68–3.74) during sex had higher odds of reporting douching in the past 3 months compared to those who were top/top versatile during sex.

Among those who reported douching in the last 3 months, increased frequency of douching prior to receptive anal sex was greater among participants who identified as being HIV negative and currently on PrEP ($\beta = 0.29$; 95% CI: 0.26–0.33), HIV negative and previously on PrEP ($\beta = 0.33$; 95% CI: 0.29–0.38), and HIV positive ($\beta = 0.71$; 95% CI: 0.67–0.75), compared to those who were HIV negative and not on PrEP. Similarly, increased frequency of douching after receptive anal sex was positively associated with participants

being HIV negative and currently on PrEP ($\beta = 0.1$; 95% CI: 0.02–0.18) and HIV positive ($\beta = 0.82$; 95% CI: 0.73–0.9) compared to those who were HIV negative and not on PrEP. Results also suggest that participants who were bottoms/versatile bottoms or versatile during sex reported higher frequencies of douching before and after receptive anal sex in the past 3 months as well as age and ethnic differences in the frequency and timing of douching.

Discussion

In this U.S. national cohort of MSM, the majority of participants had engaged in recent rectal douching for the purposes of having receptive anal sex. The prevalence of douching did not significantly vary by age, region within the U.S., or race and ethnicity, suggesting it is a fairly widespread practice among MSM in this sample. It is unsurprising that douching was more common among men who identified as bottom/vers bottom, nor that it was associated with greater frequency of receptive anal sex (regardless of self-identified anal role)—as the manifest purpose for douching is to prepare for receptive anal sex. Interestingly, however, men who douched were more likely to be taking PrEP or be HIV-positive.

There is mixed evidence of the ways that douching could put one at risk for HIV via damage to the rectum lining as well as the microbiota of the lower rectum (Carballo-Diéguez et al., 2008; Javanbakht et al., 2014; Leyva et al., 2013). We did find, however, that one-in-ten men reported rectal bleeding after douching. Any increased HIV risks posed by douching could be counteracted by the biomedical protection afforded for being on PrEP (CDC, 2017, 2018) or having an undetectable viral load (Cohen et al., 2011, 2016; Eisinger, Dieffenbach, & Fauci, 2019)—both of which were associated with douching. That being said, the majority of our sample was neither on PrEP nor HIV-positive, and a noteworthy portion of these men (i.e., HIV negative and not on PrEP) reported douching ($n = 1786$ of 4745). Thus, examining any potential HIV risks posed by douching remains an important arena for future research (Carballo-Diéguez et al., 2018), and especially since products that could irritate the rectum—such as commercial enemas and soapy water—were commonly used by those who douched, and one-in-ten men who douched reported bleeding after.

Although men who identified as bottoms/vers bottoms were the most likely to douche, douching itself was practiced by versatile men as well as men identified as tops/vers tops. Thus, using sexual position identity alone, might not be a useful proxy through which to identify men who

Table 2 Rectal douching and anal sexual role, 2018–2019, valid $n=2811$ who douched in last 3 months

	Total	Top/versatile top	Versatile	Bottom/versatile bottom	Chi-squared	<i>p</i>
	$n=2811$	$n=751$	$n=643$	$n=1417$		
	Frequency (%)	Frequency (%)	Frequency (%)	Frequency (%)		
What device(s) did you use when you douched? (select all that apply)						
An enema bottle or rubber bulb	2169 (77.2)	566 (75.4)	501 (77.9)	1102 (77.8)	1.88	.39
Hose attached to the shower or a faucet	962 (34.2)	268 (35.7)	210 (32.7)	484 (34.2)	1.41	.49
Other	166 (5.9)	39 (5.2)	43 (6.7)	84 (5.9)	1.39	.50
What type of liquid did you use when you douched? (select all that apply)						
Tap water only	2368 (84.2)	613 (81.6)	536 (83.4)	1219 (86.0)	7.65	.02
Tap water and soap	423 (15.0)	122 (16.2)	99 (15.4)	202 (14.3)	1.60	.45
A commercial douche or enema (i.e., Fleet)	564 (20.1)	148 (19.7)	129 (20.1)	287 (20.3)	0.09	.96
Other	45 (1.6)	9 (1.2)	17 (2.6)	19 (1.3)	5.82	.05
In general, how long does it take you to douche?						
Less than 10 min	957 (34.0)	264 (35.2)	198 (30.8)	495 (34.9)	7.07	.31
10–30 min	1344 (47.8)	362 (48.2)	330 (51.3)	652 (46.0)		
Between 30 min and an hour	418 (14.9)	104 (13.9)	94 (14.6)	220 (15.5)		
More than an hour	92 (3.3)	21 (2.8)	21 (3.3)	50 (3.5)		
In general, how many times do you need to clean out your butt before you feel ready for sex?						
One	453 (16.1)	120 (16.0)	121 (18.8)	212 (15.0)	17.24	.03
Two	715 (25.4)	204 (27.2)	156 (24.3)	355 (25.1)		
Three	786 (28.0)	187 (24.9)	174 (27.1)	425 (30.0)		
Four	360 (12.8)	101 (13.5)	95 (14.8)	164 (11.6)		
Five or more	497 (17.7)	139 (18.5)	97 (15.1)	261 (18.4)		
During the past 3 months, have you had any bleeding from your anus after you douched?						
No	2506 (89.2)	671 (89.4)	583 (90.7)	1252 (88.4)	2.54	.28
Yes	305 (10.9)	80 (10.7)	60 (9.3)	165 (11.6)		
During the last 3 months, have you taken any fiber supplements (Fibercon, Pure) to make it easier to douche?						
No	2024 (72.0)	543 (72.3)	483 (75.1)	998 (70.4)	4.92	.09
Yes	787 (28.0)	208 (27.7)	160 (24.9)	419 (29.6)		
	Mean/Md (SD)	Mean/Md (SD)	Mean/Md (SD)	Mean/Md (SD)		
No. of times flushing/douche before receptive anal sex (past 3 months)	7.3/3	4.3/2	7.1/3	9.0/4	16.5	<.0001
No. of times douched after receptive anal sex (past 3 months)	1.6/0	1.0/0	1.7/0	1.8/0	7.35	<.0001

Table 3 Multivariable regression, factors associated with rectal douching

Parameter	Logistic regression for douching in the past 3 months				Poisson regression for number of times douched before receptive anal sex in the past 3 months				Poisson regression for number of times douched after receptive anal sex in the past 3 months					
	β Estimate	Wald 95% confidence limits	aOR	95% CI	Wald Chi-square	Pr > ChiSq	β Estimate	Wald 95% confidence limits	Wald Chi-square	Pr > ChiSq	β Estimate	Wald 95% confidence limits	Wald Chi-square	Pr > ChiSq
Age at 12-month follow-up														
17–24 years old	–					–					–			
25–35 years old	0.04	–0.14 to 0.21	1.04	0.87–1.23	0.16	0.69	0.14	0.10–0.18	47.34	<0.0001	0.26	0.16–0.35	29.56	<0.0001
36–45 years old	0.07	–0.13 to 0.27	1.07	0.88–1.31	0.46	0.50	0.42	0.37–0.47	331.09	<0.0001	0.66	0.56–0.76	160.83	<0.0001
46–50 years old	0.00	–0.28 to 0.27	1.00	0.76–1.31	0.00	0.98	0.24	0.18–0.31	56.70	<0.0001	0.95	0.82–1.07	222.85	<0.0001
Race/ethnicity														
White	–					–					–			
Black	–0.09	–0.30 to 0.13	0.92	0.74–1.14	0.60	0.44	–0.21	–0.26 to –0.15	50.29	<0.0001	0.22	0.10–0.34	12.93	<0.001
Latino	0.11	–0.05 to 0.26	1.11	0.95–1.30	1.77	0.18	0.06	0.02–0.09	11.43	<0.001	0.76	0.70–0.83	484.62	<0.0001
Asian/Pacific Islander	–0.22	–0.55 to 0.11	0.80	0.57–1.11	1.78	0.18	–0.27	–0.35 to –0.18	41.16	<0.0001	0.34	0.18–0.50	17.85	<0.0001
Other or multiracial/ethnic	0.25	0.01–0.48	1.28	1.01–1.62	4.10	0.04	–0.01	–0.06 to 0.04	0.28	0.60	0.16	0.05–0.28	7.56	0.01
Sex position														
Top/versatile top	–					–					–			
Versatile	1.15	0.99–1.32	3.17	2.68–3.74	182.35	<0.0001	0.52	0.48–0.57	500.99	<0.0001	0.56	0.47–0.66	134.54	<0.0001
Bottom/versatile bottom	1.56	1.42–1.71	4.78	4.14–5.52	452.06	<0.0001	0.75	0.72–0.79	1412.50	<0.0001	0.61	0.53–0.69	207.06	<0.0001
HIV status at 12-month follow-up [†]														
HIV negative, not on PrEP	–					–					–			
HIV negative, currently on PrEP	0.60	0.42–0.78	1.82	1.52–2.18	42.49	<0.0001	0.29	0.26–0.33	258.18	<0.0001	0.10	0.02–0.18	5.98	0.01

Table 3 (continued)

Parameter	Logistic regression for douching in the past 3 months				Poisson regression for number of times douched before receptive anal sex in the past 3 months				Poisson regression for number of times douched after receptive anal sex in the past 3 months					
	β Estimate	Wald 95% confidence limits	aOR	95% CI	Wald Chi-square	Pr > ChiSq	β Estimate	Wald 95% confidence limits	Wald Chi-square	Pr > ChiSq	β Estimate	Wald 95% confidence limits	Wald Chi-square	Pr > ChiSq
HIV negative, previously on PrEP	0.46	0.22–0.69	1.58	1.25–1.99	14.79	<0.0001	0.33	0.29–0.38	195.52	<0.0001	-0.03	-0.14 to 0.09	0.18	0.67
HIV positive	0.61	0.31–0.90	1.83	1.36–2.46	16.13	<0.0001	0.71	0.67–0.75	1052.09	<0.0001	0.82	0.73–0.90	353.09	<0.0001
HIV unknown*	0.16	-0.49 to 0.81	1.17	0.61–2.24	0.23	0.63	0.19	0.04–0.33	6.47	0.01	-0.21	-0.59 to 0.17	1.20	0.27

*HIV unknown status was due to laboratory inability to process samples (e.g., container opened in transit to lab)

†n = 88 missing HIV status data at 12-month follow-up

douche (i.e., providers can ask their patients if they are top, bottom, versatile, but it would be better to ask them whether they engage in insertive and/or receptive anal sex and if they douched). Meanwhile, although men douched more frequently before anal sex, douching after anal sex was also practiced. Examining douching differences before vs after anal sex is important, as douching post-sex might actually increase vulnerability by increasing irritation post-sex and could push seminal fluids further into the gastrointestinal tract, where there are richer blood supplies. Providers would be well served to not only ask patients if they douche, but when they do it, what products they use, and how it is delivered.

These results were further supported by our regression findings highlighting the differences in magnitudes for the associations between sex position and douching behavior. Furthermore, douching as well as the frequency and timing of douching were associated with HIV and PrEP status in multivariable analyses. These results suggest that douching behaviors not only vary between those who have seroconverted but also by PrEP status. Those who currently used PrEP and formerly used PrEP had a higher odds of douching and increased counts of douching before and after anal sex compared to those not on PrEP. Those taking PrEP are more likely to be engaged in sexual health care and thus may view douching as part of their sexual health practices. Given that there are ways in which douching can be harmful (e.g., rectal bleeding), our findings suggest that providers should include conversations about douching with their MSM patients, particularly those on PrEP. Meanwhile, some researchers have been investigating whether douching could be an effective means in which to deliver rectal microbicides to prevent HIV (Carballo-Dieguez et al., 2008, 2010; Hoang et al., 2019; Tingler, Connochie, & Bauermeister, 2020).

Our findings should be understood in light of their limitations. Although this is a large, U.S. national, sample of MSM, it is not meant to be representative of all MSM. In order to be included in these analyses, participants had to have completed both the baseline assessments (e.g., enrollment survey and secondary survey) as well as the month 12 assessment, because measures were derived from both in the present study. Responses themselves were self-reported and thus subject to recall bias and social desirability; however, desirability bias is minimized some given that the survey was self-administered via internet (Groves, Westmoreland, Rendina, & Nash, 2019b). The study was designed to reach cisgender men who have sex with men; however, we enrolled transgender men and transgender women who otherwise met eligibility criteria. The sample size for these participants was understandably low, limiting our power to say much with their data. In addition, a number of transgender participants indicated that some questions, particularly

around anal sexual identity role were not germane to their experience. It would be necessary to conduct an assessment of sexual behavior that was more inclusive of transgender experiences, and for that reason, we did not include any data from trans persons in the present study.

Web-based recruitment also increases our vulnerability to repeat participation or otherwise falsified data. However, we followed established and effective measures to minimize these risks (Bauermeister et al., 2012; Grov et al., 2019b; Khosropour, Johnson, Ricca, & Sullivan, 2013). This included advertising only to participants geolocated in the U.S., links that expired after one click, blocking multiple submissions from a given IP address, and requiring unique and valid mailing addresses for HIV test kits. Further, the incentive for participating in the study was relatively modest which can help to disincentivize repeat participation, were someone to figure out how to.

Conclusion

Recent rectal douching was practiced by two-thirds of participants in this study. Some data have suggested that douching can increase biological vulnerability to HIV transmission; however, that could be mitigated by PrEP and treatment as prevention. Being HIV positive and being on PrEP were associated with douching; however, most HIV-negative participants in this study were not on PrEP (which is emblematic of MSM more generally), and—at least in this study—a noteworthy number of these individuals engaged in douching. And finally, because douching was observed among tops/vers tops, bottoms/vers bottoms, and versatile participants, we highlight that health messaging regarding douching practices should be sensitive to the fact that is not a behavior restricted only to people who identify as bottoms. Although it was beyond the scope of the present study, our findings highlight the need for more research on the impact douching can have on the rectal microenvironment and thus vulnerability to HIV and other STIs.

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Declarations

Conflict of interest The authors have no conflicts of interest to declare.

Ethical Approval This study was approved by the City University of New York Institutional Review Board.

References

- Bauermeister, J. A., Pingel, E., Zimmerman, M., Couper, M., Carballo-Díeguez, A., & Strecher, V. J. (2012). Data quality in HIV/AIDS web-based surveys: Handling invalid and suspicious data. *Field Methods*, 24(3), 272–291.
- Carballo-Díeguez, A., Bauermeister, J., Ventuneac, A., Dolezal, C., & Mayer, K. (2010). Why rectal douches may be acceptable rectal-microbicide delivery vehicles for men who have sex with men. *Sexually Transmitted Diseases*, 37, 228–233. <https://doi.org/10.1097/OLQ.0b013e3181bf9b2d>.
- Carballo-Díeguez, A., Bauermeister, J. A., Ventuneac, A., Dolezal, C., Balan, I., & Remien, R. H. (2008). The use of rectal douches among HIV-uninfected and infected men who have unprotected receptive anal intercourse: Implications for rectal microbicides. *AIDS and Behavior*, 12(6), 860–866.
- Carballo-Díeguez, A., Lentz, C., Giguere, R., Fuchs, E. J., & Hendrix, C. W. (2018). Rectal douching associated with receptive anal intercourse: A literature review. *AIDS and Behavior*, 22(4), 1288–1294.
- CDC. (2017). *Pre-exposure prophylaxis for the prevention of HIV infection*. Retrieved from <https://www.cdc.gov/hiv/pdf/risk/prep/cdc-hiv-prep-guidelines-2017.pdf>
- CDC. (2018). *US Public Health Service: Preexposure prophylaxis for the prevention of HIV infection in the United States—2017 Update: A clinical practice guideline*. Retrieved from <https://www.cdc.gov/hiv/pdf/risk/prep/cdc-hiv-prep-guidelines-2017.pdf>
- CDC. (2019). *HIV Surveillance Report, 2017*. Retrieved from <http://www.cdc.gov/hiv/library/reports/hiv-surveillance.html>
- Cohen, M. S., Chen, Y. Q., McCauley, M., Gamble, T., Hosseinipour, M. C., Kumarasamy, N., ... Pilotto, J. H. S. (2011). Prevention of HIV-1 infection with early antiretroviral therapy. *New England Journal of Medicine*, 365(6), 493–505.
- Cohen, M. S., Chen, Y. Q., McCauley, M., Gamble, T., Hosseinipour, M. C., Kumarasamy, N., ... Pilotto, J. H. S. (2016). Antiretroviral therapy for the prevention of HIV-1 transmission. *New England Journal of Medicine*, 375(9), 830–839.
- Dangerfield, D. T., Ober, A. J., Smith, L. R., Shoptaw, S., & Bluthenthal, R. N. (2018a). Exploring and adapting a conceptual model of sexual positioning practices and sexual risk among HIV-negative black men who have sex with men. *Journal of Sex Research*, 55(8), 1022–1032.
- Dangerfield, D. T., Smith, L. R., Anderson, J. N., Bruce, O. J., Farley, J., & Bluthenthal, R. N. (2018b). Sexual positioning practices and sexual risk among black gay and bisexual men: A life course perspective. *AIDS and Behavior*, 22(6), 1919–1931.
- Dangerfield, D. T., Smith, L. R., Williams, J., Unger, J., & Bluthenthal, R. N. (2017). Sexual positioning among men who have sex with men: A narrative review. *Archives of Sexual Behavior*, 46(4), 869–884.
- Eisinger, R. W., Dieffenbach, C. W., & Fauci, A. S. (2019). HIV viral load and transmissibility of HIV infection: Undetectable equals untransmittable. *Journal of the American Medical Association*, 321(5), 451–452.
- Grov, C., Stief, M., Westmoreland, D. A., MacCrate, C., Mirzayi, C., & Nash, D. (2020). Maximizing response rates to ads for free at-home HIV testing on a men-for-men geosocial sexual networking app:

- Lessons learned and implications for researchers and providers. *Health Education & Behavior*, 47, 5–13. <https://doi.org/10.1177/1090198119893692>.
- Grov, C., Westmoreland, D. A., Carneiro, P. B., Stief, M., MacCrate, C., Mirzayi, C., ... Nash, D. (2019a). Recruiting vulnerable populations to participate in HIV prevention research: Findings from the Together 5000 Cohort Study. *Annals of Epidemiology*, 35, 4–11.
- Grov, C., Westmoreland, D., Rendina, H. J., & Nash, D. (2019b). Seeing is believing? Unique capabilities of internet-only studies as a tool for implementation research on HIV prevention for men who have sex with men: A review of studies and methodological considerations. *Journal of Acquired Immune Deficiency Syndromes*, 82, S253–S260.
- Hambrick, H. R., Park, S. H., Goedel, W. C., Morganstein, J. G., Kreski, N. T., Mgbako, O., & Duncan, D. T. (2018). Rectal douching among men who have sex with men in Paris: Implications for HIV/STI risk behaviors and rectal microbicide development. *AIDS and Behavior*, 22(2), 379–387.
- Hart, T. A., Wolitski, R. J., Purcell, D. W., Gómez, C., Halkitis, P., & Seropositive Urban Men's Study, T. (2003). Sexual behavior among HIV-positive men who have sex with men: What's in a label? *Journal of Sex Research*, 40(2), 179–188.
- Hoang, T., Date, A. A., Ortiz, J. O., Young, T.-W., Bensouda, S., Xiao, P., ... Ensign, L. M. (2019). Development of rectal enema as microbicide (DREAM): Preclinical progressive selection of a tenofovir prodrug enema. *European Journal of Pharmaceutics and Biopharmaceutics*, 138, 23–29.
- Javanbakht, M., Stahlman, S., Pickett, J., LeBlanc, M.-A., & Gorbach, P. M. (2014). Prevalence and types of rectal douches used for anal intercourse: Results from an international survey. *BMC Infectious Diseases*, 14(1), 95. <https://doi.org/10.1186/1471-2334-14-95>
- Kelley, C. F., Kraft, C. S., de Man, T. J., Duphare, C., Lee, H.-W., Yang, J., ... Sullivan, P. S. (2017). The rectal mucosa and condomless receptive anal intercourse in HIV-negative MSM: Implications for HIV transmission and prevention. *Mucosal Immunology*, 10(4), 996–1007.
- Khosropour, C. M., Johnson, B. A., Ricca, A. V., & Sullivan, P. S. (2013). Enhancing retention of an Internet-based cohort study of men who have sex with men (MSM) via text messaging: Randomized controlled trial. *Journal of Medical and Internet Research*, 15(8), e194. <https://doi.org/10.2196/jmir.2756>.
- Klein, H. (2009). Sexual orientation, drug use preference during sex, and HIV risk practices and preferences among men who specifically seek unprotected sex partners via the internet. *International Journal of Environmental Research and Public Health*, 6(5), 1620–1632.
- Leyva, F. J., Bakshi, R. P., Fuchs, E. J., Li, L., Caffo, B. S., Goldsmith, A. J., ... Leal, J. P. (2013). Isoosmolar enemas demonstrate preferential gastrointestinal distribution, safety, and acceptability compared with hyperosmolar and hypoosmolar enemas as a potential delivery vehicle for rectal microbicides. *AIDS Research and Human Retroviruses*, 29(11), 1487–1495.
- Lick, D. J., & Johnson, K. L. (2015). Intersecting race and gender cues are associated with perceptions of gay men's preferred sexual roles. *Archives of Sexual Behavior*, 44(5), 1471–1481.
- McGaugh, A., Miller, C., King, J., McManus, K., Alcaide, M. L., Bauermeister, J., ... Klatt, N. (2019). *1289. Douching and rectal inflammation in sexual minority men: Implications for HIV acquisition*. Paper presented at the Open Forum Infectious Diseases.
- Moskowitz, D. A., & Hart, T. A. (2011). The influence of physical body traits and masculinity on anal sex roles in gay and bisexual men. *Archives of Sexual Behavior*, 40(4), 835–841.
- Moskowitz, D. A., Rieger, G., & Roloff, M. E. (2008). Tops, bottoms and versatiles. *Sexual and Relationship Therapy*, 23(3), 191–202.
- Nash, D., Stief, M., MacCrate, C., Mirzayi, C., Patel, V. V., Hoover, D., ... Grov, C. (2019). A web-based study of HIV prevention in the era of pre-exposure prophylaxis among vulnerable HIV-negative gay and bisexual men, transmen, and transwomen who have sex with men: Protocol for an observational cohort study. *JMIR Research Protocols*, 8(9), e13715. <https://doi.org/10.2196/13715>.
- Noguera-Julian, M., Rocafort, M., Guillén, Y., Rivera, J., Casadellà, M., Nowak, P., ... Bellido, R. (2016). Gut microbiota linked to sexual preference and HIV infection. *EBioMedicine*, 5, 135–146.
- Noor, S. W., & Rosser, B. R. S. (2014). Enema use among men who have sex with men: A behavioral epidemiologic study with implications for HIV/STI prevention. *Archives of Sexual Behavior*, 43(4), 755–769.
- Pachankis, J. E., Battenwieser, I. G., Bernstein, L. B., & Bayles, D. O. (2013). A longitudinal, mixed methods study of sexual position identity, behavior, and fantasies among young sexual minority men. *Archives of Sexual Behavior*, 42(7), 1241–1253.
- Parsons, J. T., Schrimshaw, E. W., Wolitski, R. J., Halkitis, P. N., Purcell, D. W., Hoff, C. C., & Gómez, C. A. (2005). Sexual harm reduction practices of HIV-seropositive gay and bisexual men: Serosorting, strategic positioning, and withdrawal before ejaculation. *AIDS*, 19, S13–S25.
- Sherriff, N. S., Jones, A.-M., Mirandola, M., Gios, L., Marcus, U., Llewellyn, C., ... Toskin, I. (2020). Factors related to condomless anal intercourse between men who have sex with men: results from a European bio-behavioural survey. *Journal of Public Health*, 42(2), e174–e186. Retrieved from <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC7251420/pdf/fdz052.pdf>
- Tingler, R. C., Connochie, D., & Bauermeister, J. A. (2020). Rectal douching and microbicide acceptability among young men who have sex with men. *AIDS and Behavior*, 24(5), 1414–1421.
- Van de Ven, P., Kippax, S., Crawford, J., Rawstone, P., Prestage, G., Grulich, A., & Murphy, D. (2002). In a minority of gay men, sexual risk practice indicates strategic positioning for perceived risk reduction rather than unbridled sex. *AIDS Care*, 14(4), 471–480.
- Van Tieu, H., Li, X., Donnell, D., Vittinghoff, E., Buchbinder, S., Parente, Z. G., & Koblin, B. (2013). Anal sex role segregation and versatility among men who have sex with men: EXPLORE study. *Journal of Acquired Immune Deficiency Syndromes*, 64(1), 121–125.
- Wei, C., & Raymond, H. F. (2011). Preference for and maintenance of anal sex roles among men who have sex with men: Sociodemographic and behavioral correlates. *Archives of Sexual Behavior*, 40(4), 829–834.

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