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**Preferences for HIV PrEP care among gay, bisexual, and other men who have sex with men: a large discrete choice experiment**

Viraj V. PATEL<sup>1</sup>, Eli A. ANDRADE<sup>1,2</sup>, Rebecca ZIMBA<sup>3,4</sup>, Chloe MIRZAYI<sup>3</sup>, Chenshu ZHANG<sup>1</sup>, Michael KHARFEN<sup>5</sup>, Rupali DOSHI<sup>5</sup>, Denis NASH<sup>3,4</sup>, Christian GROV<sup>3,6</sup>

<sup>1</sup>Division of General Internal Medicine, Department of Medicine, Albert Einstein College of Medicine, Montefiore Health System, Bronx, New York, USA

<sup>2</sup>Department of Behavioral and Community Health Sciences, School of Public Health, University of Pittsburgh, Pittsburgh, PA, USA

<sup>3</sup>Institute for Implementation Science in Population Health (ISPH), City University of New York (CUNY), New York, New York, USA

<sup>4</sup>Department of Epidemiology and Biostatistics, Graduate School of Public Health and Health Policy, City University of New York (CUNY), New York, New York, USA

<sup>5</sup>District of Columbia Department of Health, HIV/AIDS, Hepatitis, STD and TB Administration, Washington, DC, USA

<sup>6</sup>Department of Community Health and Social Sciences, Graduate School of Public Health and Health Policy, City University of New York (CUNY), New York, New York, USA

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**Corresponding Author:**

Viraj V Patel, MD, MPH

Division of General Internal Medicine

Albert Einstein College of Medicine, Montefiore Health System

3300 Kossuth Avenue, Bronx, NY, USA 10467

Phone - 718-920-7102; Fax: 718-561-5165

Email: [viraj.patel@einsteinmed.edu](mailto:viraj.patel@einsteinmed.edu)

## Abstract

**Objective:** We aimed to identify preferences for PrEP care among diverse gay, bisexual, and other men who have sex with men (BLGBM) in the US with discrete choice experiment (DCE).

**Design:** We conducted two DCEs to elicit care delivery preferences for Starting and Continuing PrEP among 16-49 year-old HIV negative GBM not using PrEP from across the United States. DCEs assessed preferences for care options including location, formulation (pills, injectable), lab testing, and costs. Participants completed 16 choice tasks and utility scores and relative importance were estimated. We performed latent class analyses to identify groups within each DCE, and multivariable logistic regression to identify sociodemographic characteristics associated with class membership.

**Results:** Among 1514 participants, 46.5% identified as Latino, 21.4% Black, and 25.2% White. For Starting PrEP DCE, two latent classes were identified: “In-Person” (28.5%) which preferred in-person care and lab testing, and “Virtual” (71.5%) which preferred telehealth and at-home lab testing. For Continuing PrEP DCE, two latent classes were identified: “Pills” (23.6%) which preferred oral PrEP with low-cost options and “No Cost/Injectable” (76.4%) which strongly preferred no-costs and injectable PrEP. In multivariable models for Starting PrEP and for Continuing PrEP, latent class membership was significantly associated with a range of sociodemographic characteristics including race/ethnicity, income, housing instability, and provider and PrEP stigma.

**Conclusions:** The preferences identified for PrEP care in this diverse GBM sample indicate the need for multiple care and formulation choices including elimination of costs to improve PrEP uptake. DCE findings can guide implementation efforts to improve equitable access to PrEP.

**Keywords:** HIV, pre-exposure prophylaxis, men who have sex with men, health care delivery, implementation science, patient preference.

## Introduction

New HIV infections in the United States (US) continue to be concentrated among key populations, with gay, bisexual, and other men who have sex with men (GBM) comprising the majority of all new infections.<sup>1</sup> While HIV prevention with pre-exposure prophylaxis (PrEP) is highly efficacious, there are enduring structural barriers to a robust and sustained implementation of PrEP, particularly among structurally marginalized GBM such as Black and Latino GBM (BLGBM).<sup>2-5</sup> Although intention to use PrEP is high among BLGBM, significant gaps between intention and use persist,<sup>6-9</sup> and inequities in both uptake and continued use of PrEP.<sup>8,10,11</sup> These findings suggest that traditional care approaches for PrEP delivery do not align with the needs of BLGBM, exacerbating disparities in new HIV infections.<sup>12,13</sup>

Numerous factors influence PrEP use among BLGBM,<sup>5,14-20</sup> including care delivery strategies (e.g., access to convenient clinical care, affirming providers, PrEP formulation choices, and cost). Implementation of care strategies that prioritize preferences of diverse BLGBM groups may help to

promote more equitable access. However, data about which strategies for PrEP care may be most preferred and important for GBM not using PrEP are needed.

One approach to robustly identify PrEP care preferences is the use of Discrete Choice Experiments (DCEs),<sup>21</sup> a quantitative approach that can be used to systematically elicit product or program preferences in a priority population.<sup>22-24</sup> DCEs can facilitate identification of program attributes important to the population of interest,<sup>24-28</sup> and allow implementers to optimize real-world effectiveness by better matching program attributes to those preferred by the priority population. Few studies have used DCEs to robustly identify and prioritize preferences and trade-offs for PrEP care among GBM groups. The objective of the current study was to identify preferences for PrEP care initiation and continuation among diverse GBM groups at priority for HIV prevention across the U.S. but not using PrEP.

## Methods

We conducted two DCEs among *Together 5,000* cohort study (T5K) participants, an internet-based longitudinal study of a geographically diverse U.S. national sample of HIV-negative men, trans men, and trans women who have sex with men at elevated HIV risk.<sup>29</sup> A detailed description of this cohort has been reported elsewhere.<sup>29</sup>

### *Development and design of the DCEs*

We selected attributes (i.e., characteristics of PrEP care services) and their levels (e.g. in-person vs. virtual care) based on a literature review of PrEP barriers and facilitators among GBM in the U.S. and via 15 individual interviews with PrEP program implementers at two health departments (New York City and Washington D.C.), community-based organizations, and physicians who prescribe PrEP, and three focus group discussions with BLGBM. Participants received a \$35 online gift card.

We developed two different DCEs focusing on (1) starting PrEP and (2) continuing PrEP (see Supplemental Table 1 and 2, <http://links.lww.com/QAD/D423> for DCE attributes and levels). Participants completed 16 choice tasks for each DCE (see example in Supplemental Figure 1, <http://links.lww.com/QAD/D424>). Each choice task contained two juxtaposed scenarios comprised of randomized combinations of PrEP care features from which participants selected their preferred option. The DCE was designed and implemented using Lighthouse Studio 9.8.1 (Sawtooth Software) and deployed using Sawtooth's online survey hosting platform.

### *Study population and procedures*

We aimed to enroll 1,500 T5K participants in the web-based DCE who were HIV-negative and had not used PrEP in the past 30 days. We determined our sample size to facilitate robust comparisons among subgroups of interest (e.g., race, age, PrEP use history), and stratified sampling by race/ethnicity (Black, Latino, White), as precise estimates for main effects in DCEs are generally optimized with samples sizes of approximately N=200 per group.<sup>30</sup>

Participants received links via SMS or email to complete screening questions about their recent HIV test and PrEP use from March 2-May 8, 2020. Eligible participants were not HIV-positive and had not used PrEP in the past 30 days and completed a web-based informed consent. Participants then received audiovisual and written directions for the DCE, a practice choice-task, and then the DCE on starting PrEP and continuing PrEP, and questions on health insurance, sexual healthcare access, and stigma. We merged data with participants' demographic information from the parent T5K study. Participants received a \$25 online gift card compensation.

### ***Latent Class Analysis***

We estimated individual-level zero-centered part-worth utilities for each attribute level and overall relative attribute importance using a hierarchical Bayesian multinomial logit model. Next, we conducted a latent class analysis to characterize preferences and identify which combinations of attributes and levels were more important for Starting and Continuing PrEP DCE. For each DCE, we explored two to five class solutions and assessed model fit using common indices (Log-likelihood, Akaike's information criterion, Bayesian information criterion). We also considered clinical relevancy and interpretability of the results as a factor in our final solution. Analyses were performed using Lighthouse Studio 9.8.1 (Sawtooth Software).

### ***Multivariable Regression analysis***

Bivariate analyses using Chi-square and t-tests assessed associations between sociodemographic characteristics and latent class membership. We then developed multivariable logistic regression models to estimate associations between characteristics and class membership for each DCE. All variables in the bivariate analyses were included in the multivariable models; we tested for variance inflation factors to examine multicollinearity. A two-sided alpha level of 0.05 was used to determine significance for all analyses and were conducted in SAS (Version 9.4) and RStudio.

The Institutional Review Boards at City University of New York and the Albert Einstein College of Medicine approved this study.

## **Results**

Among the 1514 individuals (Table 1) who completed the DCE, almost half (46.5%) identified as Latino and 21.4% as Black (Non-Hispanic), a third did not have health insurance (33.8%) and over half (51.1%) did not have a personal doctor/healthcare provider.

### **Starting PrEP DCE**

A two latent class solution was identified for Starting PrEP (Table 1). Class 1, "In Person" (n=431, 28.5%) was characterized by preference for in-person care options. Class 2, "Virtual" (n=1083, 71.5%), preferred virtual (i.e., telehealth) or at-home care options. Figure 1a shows the relative preferences for each care attribute and level for Starting PrEP by latent classes. The "In Person" class preferred starting a PrEP conversation with in-person provider visits for and for obtaining labs. The "Virtual" class had a stronger preference for starting the PrEP conversation

virtually and at-home self-testing. Both groups preferred flexible appointment availability and same-day PrEP starts.

### Continuing PrEP DCE

A two latent class solution was identified for Continuing PrEP (Table 1). Class 1, “Pills” (n=357, 23.6%) preferred low-cost options and oral PrEP (on-demand or daily) and had a strong negative preference for injectable PrEP. Class 2, “No cost/Injectable” (n=1157, 76.4%) had strong preferences for no-costs and injectable PrEP and negative preferences for oral PrEP. Cost and PrEP formulation were the two most important attributes relative to all other choices (Figure 1b).

### Multivariable Analyses

Supplementary Table 33, <http://links.lww.com/QAD/D423> shows the full multivariable regression models. For Starting PrEP, membership in “Virtual” class compared to “In-Person” class was significantly less likely among Black or Latino compared to White participants, those with lower income, or with housing instability. “Virtual” class membership was more likely among those with higher anticipated stigma from a provider and concerns about speaking to doctors about PrEP. For Continuing PrEP, “No Cost/Injectable” class membership compared to “Pills” class was associated with ever using PrEP and reporting PrEP stigma as a barrier. “No Cost/Injectable” class membership was less likely for those with concerns about speaking to doctors about PrEP.

### Discussion

Among a large diverse sample of GBM we found significant heterogeneity in preferences for PrEP care using DCEs, with the strongest preference drivers being virtual versus in-person care options, no costs, and choices for PrEP formulation. These findings underscore the need to provide choices and flexibility for PrEP care to support engagement and retention of diverse GBM at high priority for HIV prevention.

The results for the Starting PrEP DCE showed a majority of the sample (71.5%) preferred virtual PrEP care, at-home lab testing, and same day PrEP start. Telehealth-based and low-threshold PrEP programs have been found to be acceptable, safe and feasible for PrEP implementation among GBM<sup>31,32</sup> and can overcome barriers such as geography, time, stigma, and privacy concerns<sup>33,34</sup>; expanding use of such strategies may improve uptake. However, we still found a substantial proportion of GBM in our study (28.5%) preferred in-person care, particularly structurally marginalized groups (e.g., Black, Latino, lower income, and those with housing instability). Our findings underscore the need to offer flexible and easy to access care choices.

The cost of PrEP and associated care remains a key barrier to accessing PrEP in the US. Our findings suggest that eliminating patient costs may have the largest impact on PrEP uptake relative to other factors examined. A recent review found that when cost-sharing was eliminated for preventive care, uptake increased especially for people with lower incomes.<sup>35</sup> Cost barriers are likely compounded by the fragmented US healthcare system, varied Medicaid expansion across states, and piecemeal PrEP

assistance programs<sup>36</sup> contributing to inequitable PrEP access.<sup>37-39</sup> Thus, policies and programs to eliminate costs to patients PrEP are needed.

Our findings also suggest that implementing on-demand and long-acting injectable PrEP may improve uptake among GBM who are not using PrEP. Diverse preferences for PrEP regimens underscore the need to implement and promote access to options beyond a daily pill.<sup>40</sup> Both on-demand or episodic PrEP and long-acting injectable formulations are highly effective for HIV prevention, and have been shown to be acceptable to GBM who prefer not to take a daily medication.<sup>41-43</sup> Providing choices for formulation, especially combined with eliminating costs to patients, may have a large impact on uptake.<sup>44</sup>

Interestingly, we observed in the Starting PrEP DCE that participants who reported higher anticipated stigma from a provider or concerns about speaking to doctors about PrEP, preferred telehealth and for at-home testing. Studies show that anticipated stigma hinder PrEP uptake and can contribute to high-levels of non-disclosure of sexual-orientation, behaviors, and substance use to healthcare providers.<sup>45,46</sup> Our findings suggest that virtual care options may be a strategy to help overcome anticipated stigma and potentially improve PrEP uptake for some individuals.<sup>47,48</sup>

Despite the robust and important findings, there are limitations to consider. While there may be other influential care attributes not measured, we selected attributes based on a systematic review of PrEP barriers and facilitators,<sup>5</sup> input from BLGBM, planners from two health departments, and PrEP program implementers. As DCEs are hypothetical, the stated preferences may not completely predict actual behavior. Although we had a large geographically and racially/ethnically diverse sample, findings may not be generalizable to all GBM in the US who may benefit from PrEP. Finally, the study was implemented amidst the first major wave of the COVID-19 pandemic in the US. Our findings regarding strong preferences for telehealth could be a factor of many social distancing and stay-at-home recommendations in effect at that time.

Our findings underscore the need for expanding care choices and eliminating costs to improve PrEP uptake for diverse GBM. Given that the type of care access, cost, and formulation were the strongest preference drivers for starting and continuing PrEP, implementation of state and federal policies are likely needed to ensure equitable PrEP care access and cost coverage across the US.

### **Declaration of interests**

There are no conflicts of interest.

### **Acknowledgements**

Author's contributions: V.P., MK, R.D., D.N., C.G. conceived the idea for the study. R.Z., C.M. and C.Z. contributed to the data curation and analysis. V.P. and E.A. contributed to writing of the original draft. All authors contributed to reviewing and editing.

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Figure 1a Relative Care Preferences for Starting PrEP by Latent Classes.

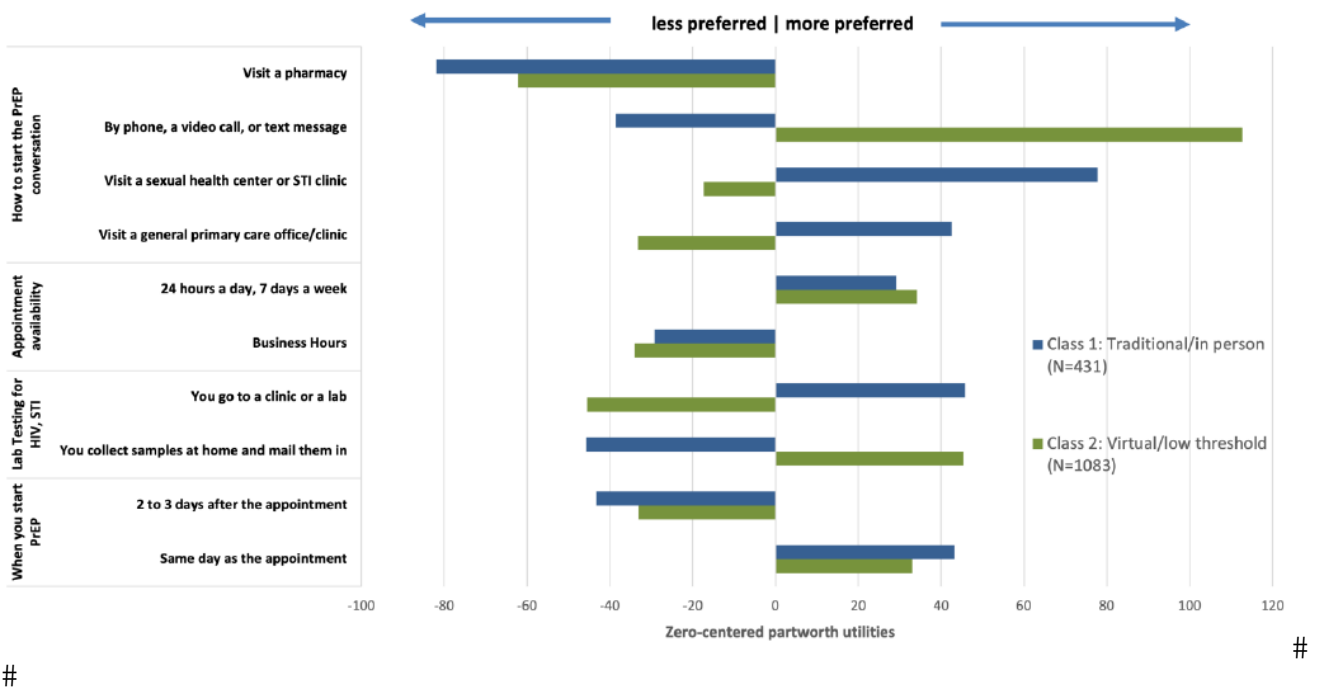


Figure 1b Relative Care Preferences for Continuing PrEP by Latent Classes.

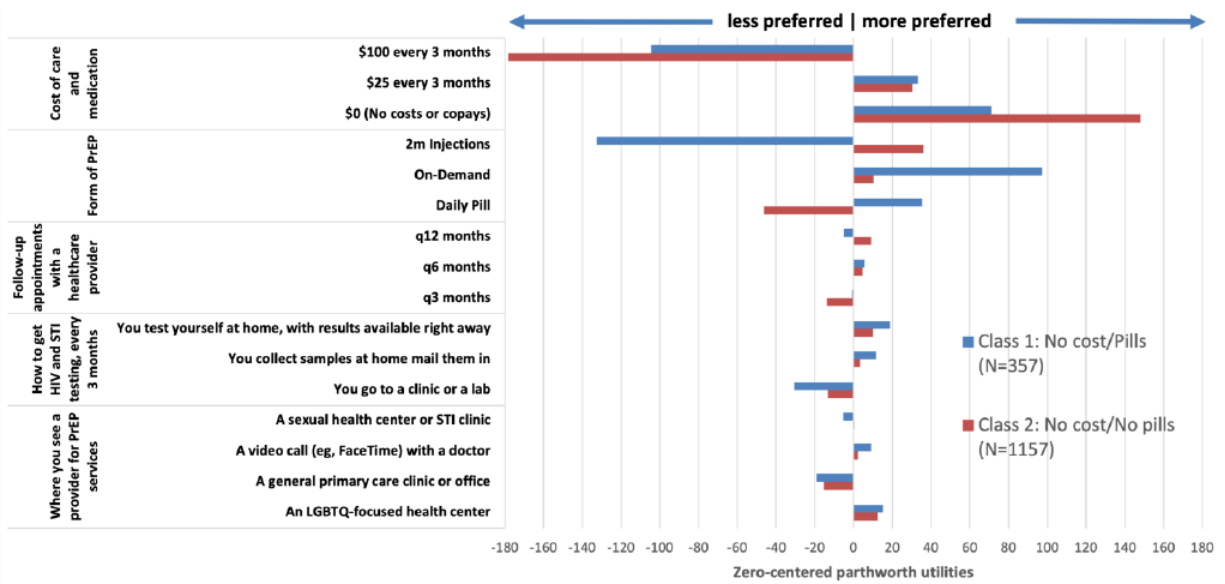


Table 1. Participant characteristics by latent classes for Starting and Continuing PrEP Care discrete choice experiments

Characteristic		Starting PrEP			Continuing PrEP		
		Class 1: <i>In-person</i> (N=431) n (%)	Class 2: <i>Virtual</i> (N=1083) n (%)	P	Class 1: <i>Pills</i> (N=357) n (%)	Class 2: <i>No Cost/Injectable</i> (N=1157) n (%)	P
Age - Mean (SD)	29.7 (7.8)	28.8 (7.7)	30.0 (7.9)		29.6 (7.8)	29.7 (7.9)	0.7109
Population Density mean (SD)	7651.15 (13844)	8252.8 (15286.6)	7424.3 (13225.8)	0.2985	7065.2 (13499.1)	7831.4 (13949.2)	0.3669
Race/Ethnicity				<b>0.0002</b>			0.5968
Black	324 (21.4)	102 (31.4)	223 (68.6)		82 (25.3)	242 (74.7)	

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Latino	704 (46.5)	223 (31.6)	483 (68.4)		156 (22.2)	548 (77.8)	
Multiple/Other	103 (6.8)	30 (29.1)	73 (70.9)		23 (22.33)	80 (77.7)	
White	383 (25.3)	75 (19.6)	308 (80.4)		96 (25.1)	287 (74.9)	
<b>Gender identity</b>				<b>0.0189</b>			0.195 1
Not cis-gender male	40 (2.6)	18 (45.0)	22 (55.0)		6 (15.0)	34 (85.0)	
Cis-gender male	1474 (97.4)	413 (28.02)	1061 (71.9)		351 (23.8)	1123 (76.2)	
<b>Education</b>				0.0696			0.519 5
High school or less	250 (16.5)	83 (33.2)	167 (66.8)		55 (22.0)	195 (12.9)	
More than high school	1264 (83.5)	348 (27.5)	916 (72.5)		302 (23.9)	962 (76.1)	
<b>Annual Income</b>				<b>&lt;.0001</b>			0.383 7
Less than \$20,000	567 (37.5)	188 (33.2)	379 (66.8)		131 (23.1)	436 (76.9)	
\$20,000 - \$49,999	655 (43.3)	191 (29.2)	464 (70.8)		146 (22.3)	509 (77.7)	
\$50,000 - \$99,999	236 (15.6)	41 (17.4)	195 (82.6)		65 (27.5)	171 (72.5)	
\$100,000 or more	56 (3.7)	11 (19.6)	45 (80.4)		15 (26.8)	41 (73.2)	
<b>Has health insurance</b>				0.6093			0.389 2
No	512 (33.8)	150 (29.3)	362 (70.7)		114 (22.3)	398 (77.7)	
Yes	1002 (66.2)	281 (28.0)	721 (71.9)		243 (24.3)	759 (75.8)	

<b>Housing instability in past year</b>				0.069			0.2378
No	1335 (89.5)	367 (27.5)	968 (72.5)		320 (23.9)	1015 (76.0)	
Yes	157 (10.5)	54 (34.4)	103 (65.6)		31 (19.8)	126 (80.3)	
<b>PrEP – ever prescribed</b>				0.323			0.1102
No	1346 (88.9)	376 (27.9)	970 (72.1)		322 (23.9)	1024 (76.1)	
Yes	168 (11.1)	53 (31.5)	115 (68.5)		31 (18.5)	137 (81.5)	
<b>Has a place to go to for sexual healthcare</b>				<b>0.0004</b>			0.8474
No	477 (31.5)	107 (22.4)	370 (77.6)		111 (23.3)	366 (76.7)	
Yes	1037 (68.5)	324 (31.2)	713 (68.8)		246 (23.7)	791 (76.3)	
<b>Has personal doctor/healthcare provider</b>				0.0674			0.9736
No	773 (51.1)	204 (26.4)	569 (73.6)		182 (23.5)	591 (76.5)	
Yes	741 (48.9)	227 (30.6)	514 (69.4)		175 (23.6)	566 (76.4)	
<b>My doctor knows I have sex with men (N = 741)*</b>				<b>0.0124</b>			0.0562
No	244 (32.9)	60 (24.6)	184 (75.4)		68 (27.9)	176 (72.1)	
Yes	497 (67.0)	167 (33.6)	330 (66.4)		107 (21.5)	390 (78.5)	

<b>Comfort talking about sex with a doctor* (N=741)</b>				<b>&lt;0.0001</b>			0.5438
Very uncomfortable	90 (12.1)	22 (24.4)	68 (75.6)		70 (9.4)	20 (2.3)	
Uncomfortable	125 (16.9)	25 (19.8)	101 (80.2)		91 (12.2)	35 (4.7)	
Neither uncomfortable or comfortable	152 (20.5)	43 (28.1)	110 (71.9)		117 (15.7)	36 (4.8)	
Comfortable	191 (25.8)	56 (29.3)	135 (70.7)		144 (19.4)	47 (6.3)	
Very comfortable	183 (24.7)	80 (43.5)	104 (56.5)		148 (19.9)	36 (4.8)	
<b>Perceived hassle to complete paperwork for free PrEP</b>				0.0555			0.6700
No	901 (59.5)	273 (30.3)	628 (69.7)		209 (23.2)	692 (76.8)	
Yes	613 (40.5)	158 (25.8)	455 (74.2)		148 (24.1)	465 (75.9)	
<b>Has used local health department for sexual healthcare</b>				<b>0.0008</b>			0.0889
No	442 (29.2)	99 (22.4)	343 (77.6)		117 (26.5)	325 (73.5)	
Yes	1072 (70.8)	332 (30.9)	740 (69.0)		240 (22.4)	832 (77.6)	
<b>Anticipated Provider Stigma mean (SD)</b>	2.41 (0.98)	2.22 (0.98)	2.48 (0.93)	<b>&lt;0.0001</b>			

\*Question only asked to those who responded Yes to having a personal doctor