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ORIGINAL PAPER

Framing HIV Pre-Exposure Prophylaxis (PrEP) for the General Public: How Inclusive Messaging May Prevent Prejudice from Diminishing Public Support

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Abstract Strategic framing of public messages about HIV pre-exposure prophylaxis (PrEP) may influence public support for policies and programs affecting access. This survey study examined how public attitudes toward PrEP differed based on the social group PrEP was described as benefiting ("beneficiary") and the moderating effect of prejudice. Members of the general public ($n = 154$) recruited online were randomly assigned to three beneficiary conditions: general population, gay men, or Black gay men. All participants received identical PrEP background information before completing measures of PrEP attitudes (specifying beneficiary), racism, and heterosexism. Despite anticipating greater PrEP adherence among gay men and Black gay men and perceiving PrEP as especially beneficial to the latter, participants expressed lower support for policies/programs making PrEP affordable for these groups vs. the general population. This disparity in support was stronger among participants reporting greater prejudice. Inclusive framing of PrEP in public discourse may prevent prejudice from undermining implementation efforts.

Keywords HIV · Pre-exposure prophylaxis (PrEP) · Framing · Public opinion · Prejudice · Black/African American · Men who have sex with men (MSM)

Introduction

Issues that are specific to socially marginalized groups often become marginalized priorities within the public arena. Social policies aimed at benefiting stigmatized groups, such as racial and sexual minorities, tend to receive lower support, advance more slowly, and be allocated fewer resources than policies serving more positively regarded, advantaged social groups [1, 2]. The initial lag in the U.S. public health response to HIV/AIDS serves as a prime example. Several critics have speculated that the limited government attention and funding designated for

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treatment and prevention initiatives following the first signs of the AIDS crisis in the early 1980s were driven by conceptions of AIDS as a disease specific to gay men and injection drug users rather than a mainstream public health concern [3, 4]. Subsequently expanding public perception of "AIDS patients" beyond these stigmatized groups to encompass women and children was key to leveraging political support and securing government aid [3].

In recent years, there have been significant medical advances in HIV prevention, including the development and empirical validation of oral antiretroviral pre-exposure prophylaxis (PrEP) as a medication that substantially reduces an individual's susceptibility to HIV acquisition [5–11]. A once-daily, prescription-based PrEP regimen of tenofovir disoproxil fumarate with emtricitabine (Truvada®) has been approved by the U.S. Food and Drug Administration (FDA) since 2012 [12]. PrEP is recommended by the U.S. Centers for Disease Control and Prevention (CDC) for prescription to men and women at high risk for HIV acquisition due to sexual behavior, injection drug use, or both [13], a risk status applicable to an estimated 1.2 million Americans [14]. Despite PrEP's high efficacy, simple dosing schedule, and acceptable side effect profile (see [15] and [16] for review), uptake has been slow, due in part to low public awareness as well as controversy fueled by misinformation and moralism [17]. The expense of PrEP, estimated to be over $17,000 per year for the medication alone plus the cost of accompanying professional services [18], also poses a potential barrier to uptake. Many PrEP users are reliant on financial support from outside sources such as commercial insurance or government aid to afford their prescriptions [18, 19].

Opposition to PrEP among the general public could threaten current financial support programs for PrEP as well as the development of new funding initiatives that influence access and uptake. Public opinion often has a substantial impact on policy [20]. Recognizing lessons learned from the early days of HIV/AIDS, when AIDS appeared in the public eye as a disease of the socially marginalized and funding allocated to the cause was limited, careful attention ought to be paid to the framing of PrEP in public awareness campaigns, popular media, and commercial advertisements that will shape the general public's understanding and attitudes surrounding this emergent biomedical technology.

In the current study, we sought to shed light on how framing PrEP in terms of the group of people perceived to benefit could influence public support for PrEP. Framing a social issue involves shaping public understanding and opinion of that issue by activating a particular schema, or cognitive lens, that guides interpretation of the issue and the basis for its evaluation [21]. Experimental research in the realm of race and social policy has demonstrated the significant impact that framing an issue by associating it with a particular group can have on public opinion. For example, including an image of a Black woman as opposed to a White woman in messaging around welfare has been found to increase opposition to welfare spending [22], and including an image of a Black perpetrator in messaging around crime has strengthened endorsement of punitive crime policy [23] in samples of White Americans. Furthermore, even subtle references to a racial/ethnic group within policy messaging can increase the likelihood that prejudice toward the given group will come into play when evaluating the policy [24, 25]. Accordingly, some communications experts assert that even when race and racism are fundamental to a social issue, messaging around the issue that uses inclusive language emphasizing the relevance of the issue to all Americans rather than language that connotes race or singles out particular racial groups may be more persuasive to the general public [26].

Such framing considerations may be particularly important to the successful promotion and dissemination of PrEP. PrEP is associated with a disease that disproportionately affects sexual, racial, and other minority communities [27]; however, framing PrEP as a tool for these particular stigmatized groups when introducing it to mainstream audiences may diminish public enthusiasm. This may be especially probable when singling out men who have sex with men (MSM)—particularly Black MSM—as key populations to prioritize for PrEP, given pre-existing stereotypes of these groups as sexually promiscuous and accountable for the spread of HIV [28–31]. Members of the U.S. general public have been found to assign more blame to, feel less sympathy for, and express lower willingness to help MSM with sexually acquired HIV infection as compared to heterosexual adults in identical circumstances [31]. Thus, highlighting PrEP's relevance to the broader range of people for whom it is indicated rather than framing it as a prevention strategy for particular stigmatized groups with high HIV incidence may circumvent the potential for prejudice to interfere with public favor for PrEP and in fact improve access for all.

Study Objectives and Hypotheses

In the current study, we used an online survey in which the group that PrEP was deemed to benefit, or the "PrEP beneficiary group," was experimentally manipulated and differences in public attitudes towards PrEP were assessed across beneficiary groups (i.e., survey conditions). Our first objective was to examine whether and how public attitudes surrounding PrEP (e.g., support for policies/programs subsidizing PrEP, approval/disapproval of PrEP use,

anticipated impact of PrEP at the individual and community level) varied by PrEP beneficiary group. The three PrEP beneficiary groups compared were (a) the general population (sexual orientation, race, and gender unspecified), (b) gay men (race unspecified), and (c) Black gay men. Gay men and Black gay men were selected as PrEP beneficiary groups in this experiment because MSM generally and Black MSM specifically are profoundly and disproportionately burdened by HIV in the U.S. [27, 32]. They are therefore among those who stand to benefit the most from PrEP and are commonly considered in this capacity [33–42]. The general population served as the non-stigmatized beneficiary group to which these groups were compared. We hypothesized that attitudes toward PrEP would be more favorable when PrEP was deemed to benefit the population at large as compared to specific stigmatized subgroups (gay men and Black gay men) [Hypothesis 1].

In consideration of the sexual orientation-based stigma faced by all MSM and the additional, intersecting race-based stigma faced by Black MSM in particular, our second objective was to assess whether prejudice (i.e., psychological bias towards a group and its members that establishes or maintains unequal power dynamics [43]) exacerbated the framing effect of PrEP beneficiary group on public attitudes towards PrEP. We examined two forms of prejudice in particular as moderators: prejudice associated with race (racism) and prejudice associated with sexual orientation (heterosexism). We hypothesized that when comparing gay men to the general population as the PrEP beneficiary group, heterosexism (but not racism) would moderate the relationship between beneficiary group and public attitudes toward PrEP, such that a greater disparity in attitudes toward the two beneficiary groups (favoring the general population) would be expressed at higher levels of heterosexism [Hypothesis 2a]. Additionally, we hypothesized that when comparing Black gay men to the general population as the PrEP beneficiary group, both forms of social prejudice would moderate the relationship between beneficiary group and public attitudes toward PrEP, such that a greater disparity in attitudes toward the two beneficiary groups (favoring the general population) would be expressed at higher levels of racism and at higher levels of heterosexism [Hypothesis 2b].

In addition to testing these hypotheses and based on our primary findings, we conducted post hoc mediation and conditional process (moderated mediation) analyses to explore attitudinal pathways through which PrEP beneficiary frame could have impacted PrEP policy-related attitudes specifically and to examine whether and how the nature and magnitude of these indirect pathways varied by level of prejudice (see Appendix 1 of the electronic supplementary materials).

Methods

Participants and Procedures

During August and September of 2014, a sample of the general public ($n = 154$) completed an anonymous online survey as part of a larger study ($n = 296$) about public attitudes toward PrEP. English-speaking adults aged 18 years and older and living in the U.S. were eligible. Recruitment was conducted through two Internet-based survey platforms: Amazon's Mechanical Turk (https://www.mturk.com/) and the Yale School of Management eLab (https://elab.som.yale.edu/). Participants recruited from both of these sources were included within the current substudy ($n = 88$ Mechanical Turk participants, $n = 66$ eLab participants).[1] Both Amazon's Mechanical Turk and the Yale School of Management eLab are online survey interfaces through which members of the general public who are interested in participating in survey research can register and enroll in available studies for free and receive compensation [44, 45]. Participants in the larger study who were involved in a separate message-framing experiment ($n = 117$) and those who failed the attention/manipulation check described below ($n = 25$) were excluded from analyses.

Upon enrollment, participants were assigned through automated randomization to one of three survey conditions. Based on their assigned condition, they responded to PrEP attitude items framed according to one of three PrEP beneficiary groups: (a) people in general (General Population Condition), (b) gay men (Gay Men Condition), or (c) Black gay men (Black Gay Men Condition). Survey conditions were identical except for the PrEP beneficiary group among whom participants were informed that HIV continued to spread and with respect to whom the PrEP attitudinal items referred.

At the outset of the survey, participants were provided with background information about HIV (e.g., modes of transmission) and reported their knowledge of PrEP and prior experience using it. Participants were then informed that many members of their assigned PrEP beneficiary group became infected with HIV every year in the U.S. Next, a brief introduction to PrEP was provided, including its once-daily dosing schedule, clinical trial evidence, and FDA approval (see Appendix 2 of the electronic supplementary

[1] Within our sample, participants recruited via Amazon's Mechanical Turk compared to those recruited via the Yale School of Management eLab did not significantly differ in terms of age, ethnicity, race, sexual orientation, or education. The only significant sociodemographic difference identified was with regard to gender, with a greater proportion of Mechanical Turk participants than eLab participants being male [55 vs. 29 %, respectively, $\chi^2(1) = 9.73$, $p < .01$]. Gender was adjusted for in all primary and post hoc analyses.

Table 1 Mean differences in PrEP attitudes by PrEP beneficiary group: general population vs. gay men vs. Black gay men

PrEP attitude scales	No. of items	Cronbach's α[a]	Sample item	Condition 1: General Population ("People") M (SE)	Condition 2: Gay Men M (SE)	Condition 3: Black Gay Men M (SE)
1. Respect for Taking PrEP	9	.91	A [person/gay man/Black gay man] should be proud of himself/herself for taking PrEP.	4.39 (.10)$_a$	4.33 (.08)$_a$	4.41 (.07)$_a$
2. Support for PrEP Financial Assistance	6	.89	Government funding should go towards making PrEP available to [people/gay men/Black gay men] who are at high risk for HIV.	3.75 (.16)$_a$	3.33 (.13)$_b$	3.36 (.11)$_b$
3. Predicted Risk Compensation	5	.85	[People/gay men/Black gay men] would have MORE "unprotected sex" (sex without condoms) if they were taking PrEP.	2.65 (.15)$_a$	2.44 (.12)$_a$	2.55 (.11)$_a$
4. Perceived Community Benefit/Support for Access	3	.74	PrEP would decrease the rate of new HIV infections among [people/gay men/Black gay men].	4.21 (.10)$_a$	4.26 (.09)$_{ab}$	4.46 (.07)$_b$
5. Predicted Adherence	3	.74	[People/gay men/Black gay men] would NOT have any problems taking PrEP every day at the correct time.	3.40 (.12)$_a$	3.83 (.10)$_b$	3.76 (.09)$_b$

Note Mean values represent estimated marginal means with standard errors, adjusting for relevant background characteristics (race, gender, sexual orientation, education, prior knowledge of PrEP, and knowledge of disparities in HIV prevalence by race and sexual orientation). Values sharing a subscript letter (a or b) within a given horizontal row did not significantly differ from one another ($p < .05$) based on analysis of covariance (ANCOVA) least significant difference post hoc comparisons

[a] $n = 148$–152 due to missing responses

materials for full introduction provided to participants). This description did not include information about the cost of PrEP or associated services. Immediately following the introduction, participants completed the 28-item measure of PrEP attitudes, with all items worded to be specific to their assigned PrEP beneficiary group. They also completed measures of racism and heterosexism and self-reported their background characteristics. At the conclusion of the survey, participants were provided with a link to the CDC website for more information about PrEP. Participants were compensated for their participation via entry into a lottery to win a gift card or the monetary equivalent.

Measures

PrEP Attitudes

Twenty-eight items were developed to measure public attitudes towards PrEP. These items were initially created by the lead author based on a review of the literature pertaining to PrEP attitudes among high-HIV incidence groups, healthcare providers, and other stakeholders (e.g., [46–57]) and revised by two co-authors with expertise on social/behavioral aspects of PrEP and scale development (K.U. and V.A.E.). Participants were instructed to rate their agreement with statements using a Likert scale ranging from 1 (Strongly Disagree) to 5 (Strongly Agree). Full instructions, items, and scoring procedures are available in Appendix 2 of the electronic supplementary materials.

Because the measure was developed to assess different types of attitudes related to PrEP, we performed an exploratory factor analysis on the 28 items as a data-driven approach to delineating scales reflecting different PrEP attitudes. Rotated factor loadings and methodological details of the factor analysis are presented in Appendix 3 of the electronic supplementary materials. The five emergent PrEP attitude scales included *Respect for Taking PrEP*, *Support for PrEP Financial Assistance, Predicted Risk Compensation, Perceived Community Benefit/Support for Access*, and *Predicted Adherence* (see Table 1).

Social Prejudice

In light of the stigmatized characteristic(s) indicated in the Gay Men and Black Gay Men Conditions, two dimensions of social prejudice were measured: racism and heterosexism.

Racism Racism was measured with the 7-item Modern Racism Scale, a widely used, psychometrically sound measure of anti-Black racial attitudes [58]. Sample items include "Blacks are getting too demanding in their push for

equal rights" and "Over the past few years, the government and news media have shown more respect to Blacks than they deserve." Participants rated each item on a Likert scale ranging from 1 (Strongly Disagree) to 5 (Strongly Agree). Items were coded so that higher scores reflected higher racism, and a mean scale score was calculated (Cronbach's $\alpha = .94$).

Heterosexism Heterosexism was measured with a modified version of the 21-item Attitudes Toward Homosexuality Scale [59]. 17 of 21 items were adapted to specify gay *men* in particular as opposed to gay people in general since attitudes toward gay men and lesbian women may differ. For example, the original item "I won't associate with known homosexuals if I can help it" was changed to "I won't associate with known gay men if I can help it." Four items pertaining to "homosexuality" or "the gay movement" were left unchanged. Participants rated each item on a Likert scale ranging from 1 (Strongly Disagree) to 5 (Strongly Agree). Items were coded so that higher scores reflected higher heterosexism, and a mean scale score was calculated (Cronbach's $\alpha = .96$).

Background Characteristics

Participants reported sociodemographic characteristics, which were coded as *age* (years); *ethnicity* (Latino/Hispanic vs. non-Latino/Hispanic) *race* (White vs. other), *gender* (male vs. other); *sexual orientation* (heterosexual vs. other), and *education* ($<$ bachelor's degree vs. $\geq$ bachelor's degree completed). Participants were also asked to indicate their *prior knowledge of PrEP* ("Prior to this study, had you ever heard of HIV pre-exposure prophylaxis, 'PrEP,' or a daily pill that can be taken to prevent getting HIV?") and *prior experience using PrEP* ("Prior to this study, had you ever received a prescription for HIV pre-exposure prophylaxis, 'PrEP,' or a daily pill that can help prevent HIV?"). Response option for PrEP knowledge/experience items were "Yes," "No," or "I don't know/I don't remember," recoded as yes vs. other. In addition, participants were asked to indicate their *knowledge of disparities in HIV prevalence* by sexual orientation [heterosexual vs. gay men] and by race [Black gay men vs. White gay men]. For example, the item pertaining to sexual orientation stated, "In the U.S., do you think HIV is more prevalent among (a) heterosexual men or (b) gay men? Note: 'Prevalence' refers to the proportion of the group that is HIV-positive." The three response options for each of the two disparity items were greater prevalence in one group (e.g., heterosexual men), greater prevalence in the other, or equal prevalence. Response options were recoded as correct vs. incorrect.

Attention/Manipulation Check

To ensure that participants had appropriately attended to the PrEP beneficiary group presented in their assigned condition, they were asked to indicate the group of people about whom they had answered the series of questions about PrEP: "Black gay men," "Gay men (no race specified)," "people in general (neither race nor sexual orientation specified)," or "Other." They were reminded that the questions had to do with PrEP cost coverage and evaluation of PrEP users. This item was placed toward the end of the survey, deliberately separated from the set of PrEP attitude items by multiple other measures.

Analysis

Our analytic approach included the following steps:

I. *Description of Sample and Measures* Frequencies, means, and standard deviations were calculated to describe the sample and measures of interest. Bivariate correlations were performed using Pearson correlation coefficients to examine interrelationships of PrEP attitude scales and social prejudice (racism and heterosexism).

II. *Cross-Condition PrEP Attitude Comparisons* [*Test of Hypothesis 1*] Adjusting for relevant background characteristics, analysis of covariance (ANCOVA) and least significant difference (LSD) post hoc comparisons were used to identify differences in PrEP attitudes across PrEP beneficiary groups (i.e., survey conditions). We purposely selected an ANCOVA approach for these initial cross-condition PrEP attitude comparisons so that all significant differences between every pair of groups would be detected. Relevant background characteristics included conceptually related sociodemographic characteristics (race, gender, and sexual orientation), other sociodemographic characteristics significantly related to one or more PrEP attitudes as determined by correlations and independent samples t-tests (education), prior knowledge of PrEP, and knowledge of disparities in HIV prevalence by sexual orientation and race.

III. *Test of the Moderating Effects of Social Prejudice* (*PrEP Beneficiary Group* $\times$ *Prejudice Interactions*) [*Test of Hypotheses 2a and 2b*]. For those PrEP attitudes with respect to which participants favored the General Population Condition as detected by ANCOVA analyses, linear regression analyses were subsequently used to test partial, conditional, and interaction effects of PrEP beneficiary group and each form of social prejudice relative to the given

PrEP attitude, with the goal of determining whether prejudice moderated the observed difference. Thus, for each difference in PrEP attitudes that emerged between the General Population Condition and one or more of the other conditions, two sets of analyses were conducted: First, PrEP beneficiary group was dichotomized as Gay Men Condition vs. General Population Condition, with the Black Gay Men Condition excluded. Second, PrEP beneficiary group was dichotomized as Black Gay Men Condition vs. General Population Condition, with the Gay Men Condition excluded. We did not compare the Gay Men and Black Gay Men Conditions directly (excluding the General Population Condition) in the interaction analyses because we were specifically interested in exploring prejudice as a moderator of differences between stigmatized groups and the non-stigmatized majority.

For each regression analysis, our initial model included relevant background characteristics, PrEP beneficiary group, and social prejudice (racism or heterosexism) as independent variables. Our subsequent model retained all previous independent variables and added the PrEP beneficiary group and prejudice interaction term or terms (condition × racism, condition × heterosexism, and/or condition × racism × heterosexism). Given the exploratory nature of this study, we probed all interactions that were at least marginally significant ($p \leq .10$) to examine the conditional effect of PrEP beneficiary group on PrEP attitudes across different levels of prejudice. Interactions were probed by applying the Johnson-Neyman technique using Hayes' PROCESS macro [60].

Results

Description of Sample and Measures

A total of 179 participants were randomly assigned to one of the three PrEP beneficiary conditions. Of these, 154 (86 %) passed the attention/manipulation check and were included in all subsequent analyses. Most of those who failed and were therefore excluded were assigned to the general population condition ($n = 18$; $p < .05$) and reported answering PrEP attitude items about gay men or Black gay men instead of the general population as directed ($n = 13$). We believe the significant difference in attention/manipulation check failure rate across conditions is likely a reflection of beneficiary group sexual orientation and race—key components of the attention/manipulation check—being more salient in the Gay Men Condition and Black Gay Men Condition, perhaps because these characteristics were homogeneous, non-prototypical, and/or explicitly specified in the beneficiary group name. No statistically significant differences in sociodemographic characteristics (age, ethnicity, race, gender, sexual orientation, and education), prior knowledge of PrEP, knowledge of disparities in HIV prevalence, heterosexism, or racism between those who passed vs. failed were detected via follow-up independent samples t-test and Pearson χ^2 analyses.[2]

Descriptive statistics pertaining to sociodemographic characteristics, prior knowledge and use of PrEP, and knowledge of disparities in HIV prevalence are presented in Table 2. The sample was predominantly non-Hispanic, White, and heterosexually identified, similar to the general U.S. adult population [61, 62]. Participants ranged in age from 18 to 69 years and slightly less than half reported being educated at or beyond a bachelor's degree level. Only a minority of participants had previously heard of PrEP, and none had ever used it. The majority of participants were aware of HIV disparities by sexual orientation among men, but fewer were aware of disparities by race among gay men.

Table 3 presents bivariate correlations of the primary variables of interest for the three conditions combined as well as separately by condition. In the combined sample, significant intercorrelations were evident among all PrEP attitudes, revealing associations between greater respect for taking PrEP, higher support for PrEP financial assistance, lower predicted risk compensation, greater perceived community benefit/support for access, and higher predicted adherence. Racism and heterosexism were associated with one another and with lower respect for taking PrEP, lower support for PrEP financial assistance, greater predicted risk compensation, and lower perceived community benefit/support for access. Correlations within conditions largely followed this same pattern.

Cross-Condition PrEP Attitude Comparisons [Test of Hypothesis 1]

Turning to our primary analyses, our first objective was to explore differences across the three PrEP beneficiary groups (survey conditions) with respect to all five PrEP attitudes. Table 1 displays differences in PrEP attitudes by PrEP beneficiary group based on ANCOVA analyses, adjusting for relevant background characteristics. LSD post hoc comparisons revealed differences across PrEP beneficiary groups in three of the five PrEP attitudes: support for

[2] We repeated these tests using non-parametric tests (Mann–Whitney U and Fisher's exact tests) given the small size of the attention/manipulation check failure group, yielding the same results.

Table 2 Sample characteristics ($n = 154$)

	Mean (SD)
Age	32.10 (11.22)
	n (%)
Ethnicity	
Latino/Hispanic	17 (11.0)
Non-Latino/Hispanic	137 (89.0)
Race	
Black/African American	9 (5.8)
White	121 (78.6)
Asian	10 (6.5)
Other	14 (9.1)
Gender[a]	
Male	67 (43.8)
Female	83 (54.2)
Other	3 (2.0)
Sexual orientation	
Lesbian/gay	9 (5.8)
Bisexual	9 (5.8)
Heterosexual	135 (87.7)
Other	1 (.6)
Education	
<Bachelor's degree	87 (56.5)
≥Bachelor's degree	67 (43.5)
Prior knowledge of PrEP	
Yes	25 (16.2)
No	126 (81.8)
Don't know/remember	3 (1.9)
Prior use of PrEP	
No	154 (100.0)
Knowledge of disparities in HIV prevalence	
Gay men > heterosexual men	122 (79.2)
Black gay men > White gay men	62 (40.3)

[a] For this variable only, $n = 153$

PrEP financial assistance, perceived community benefit/support for access, and predicted adherence. With regard to support for PrEP financial assistance, significantly lower support for PrEP financial assistance was expressed in the Gay Men Condition and the Black Gay Men Condition vs. the General Population Condition ($p = .04$ for both comparisons); no difference in support for PrEP financial assistance was expressed between the Gay Men Condition and the Black Gay Men Condition ($p = .88$). With regard to perceived community benefit/support for access, greater perceived benefit/support was expressed in the Black Gay Men Condition vs. the General Population Condition ($p = .04$); no significant difference in perceived benefit/support was detected between the Black Gay Men Condition and the Gay Men Condition ($p = .07$) or the General Population Condition and the Gay Men Condition ($p = .72$). Finally, with regard to predicted adherence, greater adherence was predicted in the Gay Men Condition and Black Gay Men Condition as compared to the General Population Condition ($p < .01$ and $p = .02$, respectively); no difference in predicted adherence was detected between the Gay Men Condition and the Black Gay Men Condition ($p = .60$).

In sum, paradoxical to the lower support for PrEP financial assistance expressed for gay men and Black gay men as compared to the general population, these two groups were perceived to be better candidates for PrEP according to other attitudes expressed (perceived community benefit/support for access and predicted adherence).

Test of the Moderating Effects of Social Prejudice (PrEP Beneficiary Group × Prejudice Interactions) [Test of Hypotheses 2a and 2b]

Given the difference in support for PrEP financial assistance identified through the ANCOVA analyses for the two socially stigmatized PrEP beneficiary conditions—Gay Men and Black Gay Men—relative to the General Population Condition, we sought to explore the potential moderating role of social prejudice relative to this PrEP attitude in particular.[3]

In addressing Hypothesis 2a, we limited the sample to the Gay Men Condition and General Population Condition and adjusted for relevant background characteristics. No significant condition × racism effect emerged (see Table 4a; Fig. 1a), but a marginally significant condition × heterosexism effect was apparent (see Table 4b; Fig. 1b). Probing the latter interaction, we found that lower support for PrEP financial assistance was expressed for gay men vs. the general population at heterosexism values above 2.17 on the 5-point response scale, reported by 21 % of the sample, whereas there was no significant difference between the two conditions in support for PrEP financial assistance at heterosexism values equal to or below this cutoff (reported by 79 % of the sample). Results of this analysis also indicated that heterosexism was negatively associated with support for PrEP financial assistance in the Gay Men Condition ($b = -.66$, $SE = .14$, $p < .01$), but

[3] The other significant disparities in PrEP attitudes by PrEP beneficiary group involving (a) perceived community benefit/support for access and (b) predicted adherence, which had been identified via ANCOVA analyses, were opposite to our hypotheses, favoring gay men and Black gay men over the general population. We nonetheless tested condition × racism, condition × heterosexism, and condition × racism × heterosexism interactions relative to both outcomes as planned a priori. No significant interactions were found for either outcome for gay men vs. the general population or for Black gay men vs. the general population ($ps > .05$).

Table 3 Bivariate correlations among PrEP attitudes and social prejudice

	Measure	1	2	3	4	5	6	7
(a) All three conditions combined (below diagonal; $n = 154$) and General Population Condition only (above diagonal; $n = 37$)								
1	Respect for Taking PrEP	–	.37*	−.46**	.50**	.43**	−.35*	−.55**
2	Support for PrEP Financial Assistance	.51**	–	−.25	.39*	.28	−.37*	−.18
3	Predicted Risk Compensation	−.60**	−.46**	–	−.27	−.48**	.25	.28
4	Perceived Community Benefit/Support for Access	.63**	.35**	−.33**	–	.28	−.30	−.14
5	Predicted Adherence	.39**	.19*	−.42**	.35**	–	−.34*	−.09
6	Racism	−.33**	−.48**	.29**	−.19*	−.13	–	.44**
7	Heterosexism	−.71**	−.49**	.55**	−.31**	−.13	.49**	–
(b) Gay Men Condition only (below diagonal; $n = 51$) and Black Gay Men Condition only (above diagonal; $n = 66$)								
1	Respect for Taking PrEP	–	.61**	−.58**	.53**	.18	−.38**	−.78**
2	Support for PrEP Financial Assistance	.48**	–	−.56**	.46**	.17	−.58**	−.50**
3	Predicted Risk Compensation	−.69**	−.49**	–	−.23	−.17	.38**	.67**
4	Perceived Community Benefit/Support for Access	.75**	.34*	−.45**	–	.25*	−.17	−.24
5	Predicted Adherence	.62**	.32*	−.67**	.43**	–	−.11	−.01
6	Racism	−.29*	−.39**	.25	−.21	−.10	–	.42**
7	Heterosexism	−.72**	−.58**	.61**	−.49**	−.39**	.57**	–

* $p < .05$; ** $p < .01$

Table 4 Linear regression models of partial, conditional, and interaction effects of PrEP beneficiary group (survey condition) and social prejudice on support for PrEP financial assistance

Variable[a]	Model 1[b]			Model 2[b]		
	b	*SE*	*p*	*b*	SE	*p*
(a) Survey Condition (Gay Men vs. General Population) × Racism						
Condition (Gay Men)	−.27	.18	.14	−.27	.18	.14
Racism	−.32	.09	<.01	−.30	.15	.06
Condition × Racism				−.03	.18	.87
(b) Survey Condition (Gay Men vs. General Population) × Heterosexism						
Condition (Gay Men)	−.20	.18	.28	−.23	.18	.20
Heterosexism	−.53	.13	<.01	−.22	.22	.32
Condition × Heterosexism				−.44	.25	.08
(c) Survey Condition (Black Gay Men vs. General Population) × Racism						
Condition (Black Gay Men)	−.30	.18	.09	−.32	.17	.07
Racism	−.48	.09	<.01	−.27	.15	.09
Condition × Racism				−.30	.18	.10
(d) Survey Condition (Black Gay Men vs. General Population) × Heterosexism						
Condition (Black Gay Men)	−.32	.19	.09	−.35	.18	.06
Heterosexism	−.52	.13	<.01	−.08	.24	.74
Condition × Heterosexism				−.59	.27	.03

Note Condition × racism × heterosexism 3-way interactions were not significant in subsequent models tested for gay men vs. the general population and Black gay men vs. the general population (not shown)

[a] Racism and heterosexism were mean-centered for interpretation of conditional effects

[b] Models were adjusted for relevant background characteristics [race, gender, sexual orientation, education, prior knowledge of PrEP, and knowledge of disparities in HIV prevalence; knowledge of disparities included disparities by sexual orientation only for gay men vs. general population analyses (a, b) and disparities by sexual orientation and race for Black gay men vs. general population analyses (c, d)]

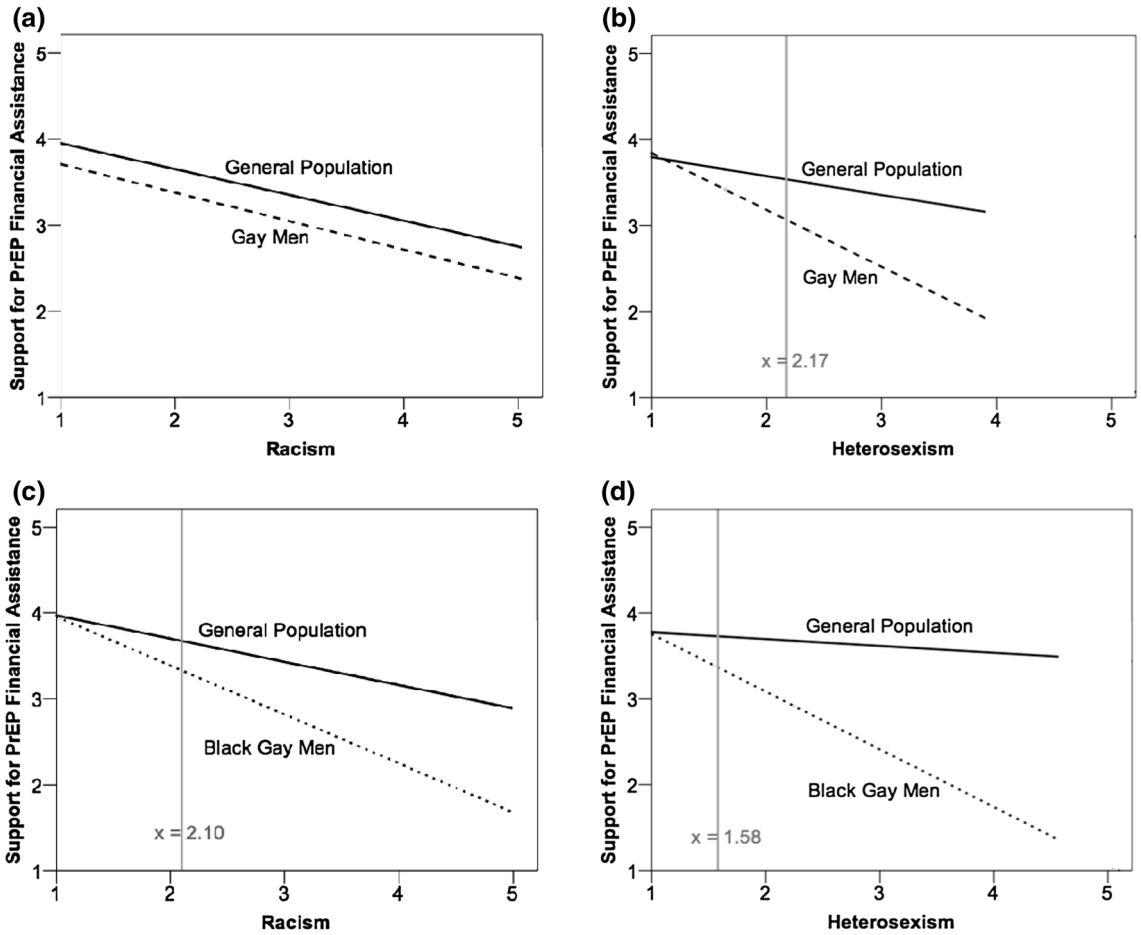

Fig. 1 Effect of PrEP beneficiary group (survey condition) on support for PrEP financial assistance as moderated by social prejudice. All models were adjusted for relevant background characteristics [race, gender, sexual orientation, education, prior knowledge of PrEP, and knowledge of disparities in HIV prevalence; knowledge of disparities included disparities by sexual orientation only for gay men vs. general population analyses (**a**, **b**) and by sexual orientation and race for Black gay men vs. general population analyses (**c**, **d**)]. *Gray vertical lines* with labeled x-values indicate the threshold above which the difference in support for PrEP financial assistance between two PrEP beneficiary groups becomes significant ($p < .05$). For each figure, graphed x-values span the range of social prejudice reported in the 2 conditions on the original 1–5 Likert scale (i.e., values not mean-centered). Figure 1a shows no significant difference in support for PrEP financial assistance reported for gay men vs. the general population at any value of racism. Figure 1b shows no significant difference in support for PrEP financial assistance reported for gay men vs. the general population at lower levels of heterosexism (≤2.17), but a significant difference at higher levels: For participants above this threshold of heterosexism (21 % of sample), lower support for PrEP financial assistance was reported for gay men vs. the general population. Figure 1c shows no significant difference in support for PrEP financial assistance reported for Black gay men vs. the general population at lower levels of racism (≤2.10), but a significant difference at higher levels: For participants above this threshold of racism (37 % of sample), lower support for PrEP financial assistance was reported for Black gay men vs. the general population. Finally, Fig. 1d shows no significant difference in support for PrEP financial assistance reported for Black gay men vs. the general population at lower levels of heterosexism (≤1.58), but a significant difference at higher levels: For participants above this threshold of heterosexism (32 % of sample), lower support for PrEP financial assistance was reported for Black gay men vs. the general population

was not significantly related to this attitude in the General Population Condition ($b = -.22$, $SE = .22$, $p = .32$). The condition × racism × heterosexism interaction was not significant ($p = .34$).

In addressing Hypothesis 2b, we limited the sample to the Black Gay Men Condition and General Population Condition and adjusted for relevant background characteristics. There was a marginally significant condition × racism effect (see Table 4c; Fig. 1c) and a significant condition × heterosexism effect (see Table 4d; 1d). Probing the interactions, we found that lower support for PrEP financial assistance was expressed for Black gay men vs. the general population at racism values above 2.10 on the 5-point response scale, reported by 37 % of the sample, whereas there was no significant difference between the two conditions in support for PrEP financial assistance at racism

values equal to or below this cutoff (reported by 63 % of the sample). Similarly, lower support for PrEP financial assistance was expressed for Black gay men vs. the general population at heterosexism values above 1.58 on the 5-point response scale, reported by 32 % of the sample, whereas there was no significant difference between the two conditions in support for PrEP financial assistance at heterosexism values equal to or below this cutoff (reported by 68 % of the sample). Results of these analyses also indicated that racism and heterosexism were both negatively associated with support for PrEP financial assistance in the Black Gay Men Condition ($b = -.57$, $SE = .11$, $p < .01$ and $b = -.67$, $SE = .15$, $p < .01$, respectively) but were not significantly related to this attitude in the General Population Condition ($b = -.27$, $SE = .15$, $p = .09$ and $b = -.08$, $SE = .24$, $p = .74$, respectively). The condition × racism × heterosexism interaction was not significant ($p = .77$).

Discussion

This empirical study informs messaging strategies by shedding light on how public attitudes toward PrEP vary according to the social group framed as benefiting from PrEP and, correspondingly, how framing can be used to buffer the adverse impact of prejudice on public support for PrEP. With regard to Hypothesis 1, despite gay men and Black gay men being seen as superior candidates for PrEP based on predicted adherence and, for Black gay men, based also on anticipated benefit, participants expressed lower support for funding policies and programs that would enable access to PrEP for these stigmatized groups as compared to the general population. This finding is especially striking because funding policies and programs for these smaller groups would likely have been perceived as a lower economic investment. This indication of lower support for policies/programs enabling financial access to PrEP for racial and sexual minorities is consistent with experimental research showing less favorable attitudes around welfare spending when the race of the beneficiary was portrayed as Black as opposed to White [22].

With regard to Hypothesis 2, we found evidence that social prejudice may underlie the differences in support for PrEP funding observed across groups: Significant disparities in support for PrEP financial access for gay men vs. the general population were evident at higher but not lower levels of heterosexism (Hypothesis 2a). Significant disparities in support for PrEP financial access for Black gay men vs. the general population were evident at (a) higher but not lower levels of racism and (b) higher but not lower levels of heterosexism (Hypothesis 2b). These findings are consistent with other research suggesting that implicating a racial/ethnic minority group in messaging around welfare policy can undermine policy support to a greater extent among people reporting more negative attitudes toward that group [24]. That prejudice was less relevant to support for PrEP financial assistance when the perceived beneficiary group was the general population vs. gay men or Black gay men in our study suggests framing PrEP as being beneficial to a diversity of people, as opposed to zeroing in on particular stigmatized social groups, could help to prevent prejudice associated with such groups from diminishing public favor for PrEP funding initiatives.

The malleability of public support for policies and programs funding PrEP is disconcerting, especially given that the cost for the medication alone is estimated to be over $17,000 annually [18], which is prohibitively expensive out of pocket for most people and a major financial stressor and probable deterrent for others. At present, access to PrEP for many people is afforded through private insurance; government aid in the form of Medicaid, Medicare, or regional PrEP-specific public funding initiatives (e.g., [63–65]); and pharmaceutical assistance programs [66, 67]. While existing funding sources put PrEP within financial reach for many individuals, it is uncertain whether coverage will continue at present levels as demand increases. Although comprehensive estimates of PrEP use across the U.S. are lacking, city-level data show areas of concentrated use [68] and early tracking of PrEP dispensation records from a subset of U.S. retail pharmacies indicates that PrEP uptake is continuously rising [69]. Even if prescription coverage is sustained or medication costs decrease (e.g., because a generic form of PrEP becomes available upon Truvada® patent expiration or because intermittent dosing becomes more prevalent), high laboratory and professional service costs associated with required medical monitoring [18] could still necessitate outside financial support.

Early indications that funding for PrEP may be precarious have emerged in the form of anecdotal reports of adverse tiering practices and fluctuations in PrEP coverage by private insurance companies [70–74]. Additionally, there has been speculation that coverage for PrEP may be vulnerable to similar religiously-based legal arguments used to deny coverage for contraception [75–77], a form of preventive healthcare to which PrEP is often analogized [78]. Although the Affordable Care Act now requires most private health insurance plans to cover contraception [79], several Supreme Court rulings and revised regulations have exempted select organizations from such coverage on religious grounds (employers' likening it to their complicity in abortion [79]). Similar exemptions from covering PrEP may emerge if coverage is portrayed as support for same-sex behavior [75, 76]—another reason to highlight the value of PrEP to people across the sexual orientation spectrum in public messaging.

To the extent that attitudes about PrEP among the general public will be informed by popular media, public awareness campaigns, and commercial advertisements, cultural representations of PrEP warrant consideration. Our findings may inform visual communication strategies in these contexts by encouraging diversity in the race, gender, and partnering patterns depicted by models to convey inclusivity in PrEP's potential applicability. Representing a wide range of PrEP users in messaging moving forward could communicate the relevance of PrEP to stigmatized groups who are at higher risk for HIV (e.g., Black MSM) as well as the broader array of people for whom it is indicated.

PrEP messaging that specifically targets Black MSM or MSM generally to the exclusion of others could risk perpetuating existing stereotypes of promiscuity attached to these groups. As it stands, the disproportionate prevalence of HIV in the MSM community likely leads many people to make assumptions about sexual behavior that reinforce such stereotypes, when in fact even MSM who do not have many sexual partners remain at higher risk for HIV than most members of the general population. This is because of the increased efficiency of HIV transmission via anal vs. vaginal intercourse; role versatility (i.e., MSM's ability to enact both receptive and insertive positions, increasing risks for acquisition and transmission); and the high prevalence of HIV within the MSM community, which increases the likelihood that any new partner from that community is HIV-infected [80]. Stereotypes of sexual recklessness and disease persist relative to Black MSM especially [30, 81, 82] despite behavioral evidence that Black MSM engage in comparable or lower levels of sexual risk behavior as compared to MSM of other races [83]. Visual media associating Black gay men with PrEP—a product that is commonly associated with promiscuity [40, 84] —may be especially stigmatizing considering the relative invisibility of this social group in media concerning other health products.

As stated in recent guidelines for PrEP provision issued by the World Health Organization [85], "Extending PrEP recommendations beyond narrowly defined groups (such as men who have sex with men and serodiscordant couples) allows for more equitable access (p. 45)." Consistent with this notion, emphasis on behavioral risk vs. group membership may be a more accurate way of communicating PrEP's applicability while simultaneously minimizing the likelihood of prejudice interfering with access, the potential for which was suggested by our results. This approach would also reinforce knowledge about HIV transmission risk behavior, whereas emphasis on group membership may provide a false sense of security for individuals who do not identify as part of a "high-risk" group but are nonetheless at substantial risk for HIV acquisition. Even among members of sociodemographic groups considered to be at *highest* risk for HIV, such as young Black MSM, a tendency to stigmatize PrEP users as sexually risky and to dismiss one's own candidacy for PrEP based on perceived divergence from that stereotype has been documented [40]. This underscores the need to not only emphasize behavior over group affiliation in messaging around PrEP, but also to present PrEP-qualifying behavior as being within the range of normal human sexual behavior rather than unusually risky or deviant [40].

It is important to note that, although the research we have presented suggests that inclusive framing of PrEP in public messaging may help to generate public favor around policies and programs that would facilitate access to PrEP, we must also be mindful of the potential for unintended and adverse consequences of such framing. For instance, messaging about PrEP in the context of direct-to-consumer advertising may be more salient or persuasive to members of priority groups such as Black MSM when featuring models who share common characteristics with that group; therefore, more general (inclusively framed) advertisements could fail to capture the attention of these groups, resulting in lost opportunity to promote awareness among those who could benefit the most. Furthermore, to the extent that framing PrEP inclusively results in PrEP being prescribed not only to people at high risk for HIV but also to lower risk individuals, such an approach may be less cost-effective in combating the epidemic at the population level [86, 87]. Further research is recommended to better understand the impact of PrEP beneficiary framing within verbal and visual messages on the attitudinal and behavioral responses of potential PrEP users and the broader public.

Additional work is also needed to understand the relevance of beneficiary frame to PrEP policy and program attitudes outside of the U.S., especially in settings where PrEP has yet to be rolled out and messaging accompanying its introduction can be strategized from the outset. Even in regions where the HIV epidemic is less restricted to stigmatized populations, inclusive framing may still be more effective than targeting specific, non-stigmatized social groups since people tend to be more forgiving in their behavioral attributions and more generous in their allocation of resources to others who are perceived to be members of the same group [88]. Beyond identifying the optimal beneficiary frame, investigating the perceived importance of PrEP financial assistance programs relative to other health initiatives within a population-based sample could help to put public support for PrEP into a broader context in order to better anticipate future funding challenges.

Several limitations to the current study merit consideration. First, our sample was recruited via Amazon's

Mechanical Turk and the Yale School of Management eLab, and therefore was not representative of the U.S. population at large. However, it was similarly diverse in some respects: For example, comparing participants in our study sample to the U.S. population, 11 vs. 17 % were Latino/Hispanic, 79 vs. 78 % were White, and 54 vs. 51 % were female, respectively [61]. This is encouraging in terms of the generalizability of our findings, but replication of this study with a more representative sample would strengthen our ability to make inferences about attitudes of the general public.

With regard to experimental design, the PrEP beneficiary groups were not mutually exclusive. Conceptually, the Gay Men Condition would have encompassed Black gay men, and the General Population Condition would have encompassed both gay men and Black gay men specifically. We intentionally designed the study this way to maximize real-world applicability, assuming that public health campaigns, popular media, and commercial advertisements were unlikely to direct public messaging about PrEP toward non-stigmatized groups, such as heterosexual men, in a way that explicitly excluded high-incidence stigmatized groups, such as MSM. Even so, considering the U.S. population is primarily composed of White, heterosexually-identified people [61, 62] and the U.S. gay male population is primarily composed of White men [89], we believe the terminology we used in reference to the general population ("people") was likely to connote *White heterosexual* people and "gay men" was likely to connote *White* gay men. This is supported by previous research suggesting that characteristics associated with a particular social group tend be more consistent with its dominant members [90].

That the PrEP beneficiary groups being compared differed not only in sociodemographic composition but also in size could prompt speculation that this variable accounted for the between-group differences in support for PrEP financial assistance that we identified rather than prejudice. That is, it could be hypothesized that participants expressed greater support in the General Population Condition because the general population encompasses more people than the other groups and therefore PrEP funding would be perceived to have a broader population-level impact in this condition. However, the moderation effects suggesting that significant disparities in funding support were only present among participants reporting higher levels of prejudice argues against this alternative explanation, as does the lack of difference in support for PrEP funding expressed for gay men vs. Black gay men despite the larger group size of the former.

A final limitation is that our PrEP attitudes measure was newly developed for the present study and had not been previously used or validated. This was necessary in the absence of other psychometrically established measures of public attitudes toward PrEP of which we were aware. We are hopeful that this measure, included in full within the electronic supplementary materials, will support further investigation of public attitudes towards PrEP and be a useful tool to other researchers, and we recommend empirical validation of the measure in future work.

To our knowledge, this is one of the first studies to explore attitudes about PrEP among the U.S. general public, most members of which are unlikely to have a direct interest in PrEP as prescribers, potential consumers, or stakeholders otherwise but, nonetheless, collectively possess the potential to impact access and uptake by others. Our findings demonstrate that support for PrEP funding among this population will likely be optimized through messaging that promotes PrEP for a broad spectrum of people, encompassing diversity with respect to gender, race, and sexual orientation. Such an approach, which avoids explicitly naming high-risk groups and activating stereotypical schemata, will help to prevent prejudiced beliefs such as heterosexism and racism from undermining public favor for policies and programs enabling access. In an ideal world, social prejudice would be eradicated and society members would strongly support resource allocation to stigmatized groups and issues not directly relevant to their own non-stigmatized majority. However, in the real world, social prejudice, whether explicit or unconscious, infiltrates policy and program development, perpetuating cycles of privilege and marginalization. While we strongly and unwaveringly advocate for the continued prioritization of intervention resources for Black MSM and other social groups most at risk for HIV acquisition, we also recommend inclusive framing of messages about PrEP aimed at the general public in an effort to foster approval and ultimately maximize access for all individuals who stand to benefit from PrEP.

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