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Social Identity and Attitudes toward HIV Pre-exposure Prophylaxis: A Structural Equation Model

Rusi Jaspal^{a,b}, Barbara Lopes^c and Ismael Maatouk^{a,d}

^aFaculty of Health & Life Sciences, De Montfort University, Leicester, UK; ^bMinority Research Profile, Åbo Akademi University, Turku, Finland; ^cCenter For Research in Neuropsychology and Cognitive Behavioral Intervention (CINEICC), Rua do Colégio Novo, Universidade de Coimbra, Coimbra, Portugal; ^dClemenceau Medical Center Affiliated with Johns Hopkins International, Beirut, Lebanon

ABSTRACT

This study focuses on the role of social identity and prejudice as causal variables in public attitudes toward pre-exposure prophylaxis (PrEP) in a UK sample. In all, 222 participants participated in an experimental vignette study with a $2 \times 2 \times 2$ design with between-participants factors of ethnicity, sexual orientation and gender, and completed measures of attitudes toward gay men, Black Africans, and PrEP. Kruskal–Wallis tests showed significant effects of gender on attitudes toward gay men and Black Africans; of ethnicity on attitudes toward gay men and PrEP; and of religion on attitudes toward gay men. A univariate analysis of variance (ANOVA) revealed more positive attitudes toward PrEP when it was presented as benefitting men (vs. women). Structural equation modeling showed that the relationship between the independent variables of gender, ethnicity, and religion and the dependent variable of attitudes toward PrEP was mediated by attitudes toward gay men and Black Africans. Individuals must perceive the principal beneficiaries of PrEP (i.e., gay men and Black Africans) positively to endorse PrEP for these groups, and sexism may reduce public acceptability of PrEP for women. Future research should use representative samples and alternative experimental manipulations, and include strength of social identification as an independent variable.

KEYWORDS

Health services; HIV; prejudice; PrEP

Introduction

Health issues that are publicly perceived to be specific to socially marginalized groups (such as racial and sexual minorities) often become deprioritized in public and policy debates. Social policies designed to benefit stigmatized groups tend to receive lower support and to be allocated fewer resources than policies that serve more positively regarded, advantaged social groups (Schneider & Sidney, 2009). Since the first clinical observations of HIV/AIDS in 1981, 78 million people have been infected with HIV and 35 million have died of AIDS globally (UNAIDS, 2017). Yet, the initial public and policy responses to HIV/AIDS were ambivalent and indecisive largely because the disease was perceived as affecting only marginalized populations, such as gay men and drug users. Such responses persist in societies

that refuse to recognize homosexuality. Prejudice appears to play a significant role in public attitudes and policy responses to health and illness.

HIV prevalence in the United Kingdom is approximately 0.16% of the population – according to a recent epidemiology report (Kirwan et al., 2016), some 101,200 people are currently living with HIV in the United Kingdom. Gay men and Black Africans are disproportionately affected – 47,000 gay men (46%) and 28,600 (28%) were living with HIV in 2015. In 2015, 57% of new HIV diagnoses were among gay men and 15% were among Black Africans.

Despite progress in treatment and prevention, HIV stigma persists and novel approaches to preventing HIV, such as pre-exposure prophylaxis (PrEP) have not met with widespread public acceptance. This has led to indecision among

CONTACT Rusi Jaspal  rusi.jaspal@cantab.net  De Montfort University, Leicester LE1-9BH, UK.

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policymakers and, undoubtedly, to continued HIV incidence. Although there has been some research into patient acceptability of PrEP (e.g., Jaspal & Daramilas, 2016), there has been no study of *public* acceptability of PrEP in the United Kingdom. This is an important focus for research into public health, given that public opinion can decisively shape policy and practice (Burnstein, 2003). Accordingly, the aim of this study is to identify the predictors of public acceptability of PrEP, a clinically effective biomedical approach to preventing HIV, in a diverse UK sample. More specifically, it investigates the role of prejudice (on the basis of gender, sexual orientation, or race) as an underlying causal variable in the formation of public attitudes toward PrEP.

PrEP for Preventing HIV

HIV is a virus which attacks CD4 lymphocytes, an important type of white blood cell which is central to healthy immune functioning. If left untreated, HIV almost invariably results in complete immunological failure and death. There is no known vaccine or cure, but the illness is now treatable with antiretroviral therapy. Prevention is the most effective tool against HIV. Condom use has been the key policy response to HIV because it is highly effective not only against HIV but also other sexually transmitted infections. However, condoms are not used consistently in all populations at risk, which has led to continued HIV incidence (Jaspal, 2018). In recent years, PrEP has emerged as a significant biomedical approach to HIV prevention. In 2012, Emtricitabine/Tenofovir Disoproxil Fumarate (sold under the brand name Truvada[®]) became the first drug to be approved by the US Food and Drug Administration for use as HIV PrEP.

In several clinical trials, PrEP has repeatedly been shown to reduce the risk of HIV transmission. The PROUD trial in the United Kingdom has shown a 86% reduction in HIV incidence in a sample of high-risk gay men in the experimental arm of the trial using daily PrEP (McCormack et al., 2016). The IPERGAY study in France and Quebec, Canada evaluated the efficacy of intermittent PrEP (used before and after sexual risk episodes) in 414 gay men and transgender women and also showed a relative risk reduction

of 86% (Molina et al., 2015). However, PrEP is not yet available on the National Health Service (NHS) in all parts of the United Kingdom although there is currently a clinical trial in England, which allows 10,000 patients at risk of HIV to access PrEP free of charge. Some people acquire PrEP by ordering a generic version of the drug online or by purchasing PrEP through a London sexual health clinic though this is not available to everyone at risk due to the costs involved.

PrEP Acceptability in People at Risk of HIV

Given that the clinical effectiveness of PrEP has now been demonstrated, studies have been conducted to ascertain PrEP acceptability in groups at elevated risk of HIV, such as gay men and Black Africans. Patient acceptability is central to the effectiveness of any clinical tool. PrEP acceptability in at-risk groups is variable – a recent meta-analysis showed an overall acceptance of PrEP in gay men at 58.7% (95% confidence interval: 52.4–63.1%) (Peng et al., 2018). A study of HIV-negative gay men attending sexual health clinics in the United Kingdom showed that 64% perceived PrEP as personally beneficial, and that PrEP acceptability was predicted by awareness of HIV risk and the perception that PrEP is effective (Bull et al., 2018).

An important theme across studies of PrEP acceptability is that of social stigma. In their qualitative study, Jaspal and Daramilas (2016) found that participants did not wish to perceive themselves as ‘high risk’ due to the stigma appended to this category. On a practical level, the high cost of PrEP constitutes a major barrier for patients (Tripathi et al., 2012). In addition to ascertaining patient acceptability, it is important to understand how the public views PrEP. Social identity factors are likely to play a role in attitude formation.

Social Identity and Public Attitudes of PrEP

Social identity theory (Tajfel, 1981) was developed to understand how human beings come to define themselves principally in terms of their group memberships. A key tenet of the theory is that the world is composed of various social categories (e.g., gay vs straight; Black vs White; male

vs female), which differ in terms of their status and power. As people come to identify with these social categories, they experience a cognitive re-definition of their sense of self in terms of their group memberships. In short, this form of self-definition motivates the individual to focus primarily upon their identity *as a group member*, rather than as a unique and distinctive individual. As one's group memberships become salient, one is motivated to engage *intergroup behavior*. One begins to see oneself and others as members of the *ingroup* or *outgroup* and to behave accordingly – often in opposition.

Social psychology research has demonstrated that human beings tend to 'other' disease, that is, they perceive it as affecting only outgroups (Joffe, 2007). HIV is thus seldom viewed as a *human* immunodeficiency virus but rather as one that affects only distant and dissimilar outgroups. Furthermore, there is empirical evidence of ingroup favoritism in the context of resource allocation – people tend to favor their own groups or groups that are close to their ingroup when resources are allocated and, accordingly, oppose outgroup beneficiaries of resources (Harvey & Bourhis, 2012). Experimental research in the United States has shown that people manifest less favorable attitudes toward welfare spending when the race of the beneficiary is portrayed as Black as opposed to White (Gilens, 1998). Studies of homophobia and racism have generally shown that men are more likely than women to manifest these forms of prejudice (Maxwell, 2015; Nagoshi et al., 2008). Furthermore, religious people and people from ethnic cultures with conservative views on sexuality are more likely than the general population to manifest homophobia (Roggemans et al., 2015).

There has been some research into public and media perspectives on PrEP. In a study of UK media representations of PrEP (Jaspal & Nerlich, 2017), it was found that stigmatizing group-level stereotypes of gay men (e.g., as hedonistic, promiscuous, and irresponsible) were drawn upon both to affirm *and* repudiate PrEP. Some media reports questioned why "we" (the heterosexual ingroup) should support an HIV prevention tool for "them" (the gay outgroup). In a US study of how public attitudes toward PrEP vary according

to the social group presented as benefitting from it (Calabrese et al., 2016), participants manifested less support for PrEP funding policies when PrEP was represented as benefitting gay men and Black gay men, suggesting that prejudice toward these stigmatized groups causes decreased support for the prevention tool. The US study by Calabrese et al. (2016) demonstrates the role of social identity and prejudice in attitude formation. However, it does not focus on the additional important variables of racism (in its own right) or sexism, which are included in the present study. Moreover, unlike the US context in which Calabrese et al.'s study was conducted, the state-funded NHS is the principal health provider in the United Kingdom and, thus, attitudes in the UK general public will play a significant role in determining PrEP policy.

Hypotheses

Building on Calabrese et al.'s (2016) study, the present experimental study investigates how prejudice based on gender, sexual orientation, or race, on the one hand, and demographic variables (e.g. participants' gender, ethnicity, and religion) influence public attitudes toward PrEP in a diverse UK sample of students. The following hypotheses are tested:

- H1. White British and White European participants will show more positive attitudes toward gay men and PrEP than other ethnic groups.
- H2. Female respondents will manifest more positive attitudes toward gay men and Black Africans and toward PrEP than male respondents.
- H3. Religious beliefs will impact attitudes toward gay men, with those reporting no religious affiliation reporting more positive attitudes toward gay men than those with a religion.
- H4. Participants will report more positive attitudes toward PrEP when the recipients are portrayed as White or male heterosexuals.
- H5. Being a female of White British/White European ethnicity and having no religion are associated with more positive attitudes toward gay men and Black Africans, which, in turn, are associated with more positive attitudes toward PrEP.

Methods

Participants

In all, 222 undergraduate students participated in this study. Participants were aged between 18 and 37 years ($M=23.34$ and $SD=2.09$). In total, 130 (59%) were females and 90 (41%) were males. Most of the 222 participants were either British Indian, $N=60$ (27%) or White British, $N=50$ (23%). In all, 32 individuals described themselves as Black African (14.4%); 22 (9.9%) as White European; 14 (6.3%) as Mixed Heritage; 11 (5%) as Chinese; 11 (5%) as Pakistani; 16 (7.2%) as 'Other'; 4 (1.8%) as Black Caribbean; and 2 (.9%) as Bangladeshi. Most of the sample also reported not having a religion, $N=70$ (31%). The most common religion was Muslim ($N=69$, 31%) followed by Christians (Catholic, Church of England, Protestants, Orthodox, etc.) ($N=51$, 23%). There were also 15 Hindus (6.7%), 10 Sikhs (4.5%), 5 Buddhists (2%), and 3 of "other" religions (1.3%). The majority of the sample was single ($N=133$, 60%) and 70 people (32%) were in a monogamous relationship; 10 (4.5%) were married; 6 (2.7%) in an open relationship; 2 (0.9%) in a civil relationship; and 1 (0.6%) in another type of relationship. Most participants were sexually active (57.1%) (see Table 1 for full descriptive and socio-demographic data).

Research Design and Procedure

This experimental vignette study employed a $2 \times 2 \times 2$ design with between-participants factors of ethnicity, sexual orientation, and gender. The ethnicity, sexual orientation, and gender of the protagonist in the vignettes were manipulated. The dependent variable for this study was attitudes toward PrEP.

An online advert was posted on the university website, inviting psychology undergraduate students to participate in the study in exchange for course credits. Participants were presented with a participant information sheet, informing them that the study focused on attitudes toward PrEP and several other issues including human identity. Participants' responses were anonymous and each participant was provided with a number in case they wanted to withdraw. None withdrew.

Table 1. Socio-demographic characteristics and descriptives.

Variables	M	SD	Minimum	Maximum
Attitudes toward PrEP	44.67	6.49	25	61
Attitudes toward gay men	38.26	10.43	8	53
Attitudes toward Black Africans	33.90	5.40	4	40
Religiosity	52.15	23.86	11	84
Socio-demographic variables				
Age	23.34	2.09	18	37
Ethnicity	British Indian 60 (27%)	White British 50 (23%)	Black African 32 (14.4%)	White European 22 (9.9%)
Religion	Muslim 69 (31%)	Christians 51 (23%)	Hindus 15 (6.7%)	Sikhs 10 (4.5%)
Civil relationship status	Single 133 (60%)	Monogamous 70 (30%)		
				Other relationships 19 (8.6%)
				Other 4 (1.8%)
Sexual orientation	Heterosexual 205 (92.3%)	Bisexual 11 (5%)	Gay 2 (.9%)	
Currently sexually active	Yes 126 (57%)	No 95 (40%)		
Gender	Females 130 (59%)	Males 90 (40%)	Other 2 (.9%)	
Taking contraceptive pill	Yes 27 (20%)	No 110 (80%)		
				Other types relationship 1 (.6%)
				Married 2 (.9%)
				Open 3 (1.3%)
				Civil relationship 4 (1.8%)
				Other 16 (7.2%)
				Black Caribbean 4 (1.8%)
				Bangladeshi 2 (.9%)

Participants were first asked whether they had heard of PrEP and, if they had, to describe it briefly. Both male and female participants were randomly, blindly, and evenly assigned to one of six experimental vignette conditions:

- gay, male, White;
- straight, male, White;
- gay, male, Black;
- straight, male, Black;
- straight, female, White;
- straight, female, Black.

Each experimental condition consisted of a separate vignette. Each vignette described one of the identity configurations listed above. Apart from the identity configuration, all of the six vignettes were identical in content and included the following text:

[Ashley/Michael/Shaniqua/Kgalema] is a 22-year-old [English/African] [woman/gay man/man]. [She/He] is HIV-negative and wants to avoid getting HIV. [She/He] is thinking of taking pre-exposure prophylaxis (PrEP), a daily pill that can protect [her/him] against HIV even if [she/he] has sex with an HIV-positive [man/woman].

Instruments

Following exposure to the experimental condition, participants were asked to indicate their level of agreement with a series of statements to capture their attitudes toward PrEP, Black Africans, and gay men, on a scale from 1 to 5 (1 = strongly disagree and 5 = strongly agree). Participants were asked to provide demographic information, including their age, ethnicity, religion, their level of religiosity (measured from 1 to 5), gender, sexual orientation, relationship status, whether or not they were sexually active, number of sexual partners in the past 12 months and, in the case of females, whether or not they were currently taking the contraceptive pill.

Attitudes toward PrEP

Drawing on the results of previous qualitative research (Jaspal & Daramilas, 2016; Williamson, Papaloukas, Jaspal, & Lond, 2018), the Attitudes

toward PrEP Scale was created (Appendix 1). The scale consisted of 14 items tapping into attitudes toward PrEP. Examples of items of this scale are as follows: “PrEP is an exciting breakthrough in medical science” (positive) and “PrEP will probably have serious side effects” (negative). The scale had a good internal reliability, $\alpha = 0.72$.

Attitudes toward Black Africans

The Generalized Group Attitude Scale (Duckitt & Mphuthing, 1998) was adapted for Black Africans as a target group. It originally consists of eight positive and negative items about Black Africans, such as “I have very positive attitude toward Black African people.” The original internal reliability was $\alpha = 0.54$, but removal of the item “I can understand people having negative attitude toward Black African people” resulted in an improved internal reliability, $\alpha = 0.74$.

Attitudes toward Gay Men

The Attitudes Toward Gay People Scale (Herek, 1994) was used to measure participants’ attitudes toward this group. The scale consists of 10 items, such as “Sex between two men is just plain wrong.” The internal reliability of the scale was good, $\alpha = 0.80$.

Religiosity

The four basic dimensions of the Religiousness Scale (Saroglou, 2011) consist of 12 items, such as “Religion helps me to try and live in a moral way.” The internal reliability of the scale was excellent, $\alpha = 0.97$.

Ethics

The study obtained ethics approval from the Faculty of Health & Life Sciences Research Ethics Committee, De Montfort University, Leicester, UK.

Results

Normal Distribution Checks

Kolmogorov–Smirnov (K-S) tests were performed to test the normality of the distributions of the

key variables of this study. K-S tests showed that the following variables were not normally distributed: religiosity, with a $D(222) = 1.65$, $p = .008$; attitudes toward gay men, with a $D(222) = 2.09$, $p < .001$; and attitudes toward Black Africans, with a $D(222) = 1.92$, $p = .001$. Attitudes toward PrEP was normally distributed $D(222) = 1.16$, $p = .14$. Since several variables of interest were not normally distributed, non-parametric Mann–Whitney, Kruskal–Wallis, and Spearman Rho’s tests have been used. The variables of gender, being currently sexually active, having heard of PrEP and the variables of the experimental conditions: vignettes of ethnicity, gender, and sexual orientation were all dummy coded to facilitate analyses.

Descriptives

As shown in Table 1, 126 (57%) of the respondents stated that they were currently sexually active while 95 (40%) stated that they were not currently sexually active. The majority of women also reported not being on the contraceptive pill. Indeed, 110 females (80%) take no contraceptive pill vs. 27 females (20%) who do take it. Chi-squared tests further showed that males were more likely than females to report being currently sexually active, $\chi^2(2) = 13.89$, $p = .001$ (Figure 1) supporting previous research by England and Bearak (2014) that showed that US male students tend to over-report sexual activity, whereas females tend to under-report and that the females that were currently sexually active ($N = 61$, 47%) were more likely to be taking the contraceptive

pill than those who were not ($N = 69$, 53%), $\chi^2(1) = 10.65$, $p = .001$. A further Chi-squared test showed that, proportionally and independently of one’s gender (male or female), there are more people that do not know of PrEP than those who do know about PrEP, $\chi^2(2) = 3.015$, $p = .22$ (Figure 2).

Effects of Ethnicity on Key Variables

Ethnic group was one of the most impactful variables in this study. Indeed, Kruskal–Wallis tests showed that ethnic group had statistically significant effects on religiosity $H(9) = 84.12$, $p < .001$; attitudes toward gay men $H(9) = 55.58$, $p < .001$; attitudes toward Black Africans $H(9) = 22.70$, $p = .007$, and attitudes toward PrEP (DV) $H(9) = 20.06$, $p = .018$. Both White British ($M = 31.60$, $SD = 19.50$) and White European ($M = 31.86$, $SD = 19.17$) participants were less religious than Indian ($M = 63.91$, $SD = 18.52$), Pakistani ($M = 67.55$, $SD = 12.97$), Chinese ($M = 50.09$, $SD = 19.95$), and Black African ($M = 67.09$, $SD = 17.77$) participants. Moreover, both White British ($M = 45.08$, $SD = 7.54$) and White European ($M = 43.68$, $SD = 7.03$) participants had more positive attitudes toward gay men than Indian ($M = 35.90$, $SD = 9.37$), Pakistani ($M = 31.27$, $SD = 10.06$), Chinese ($M = 37.27$, $SD = 11.23$), and Black African ($M = 33.61$, $SD = 11.05$) participants. These findings support Hypothesis 1 by showing that White British participants and White Europeans have much more positive attitudes toward gay men than other ethnic groups.

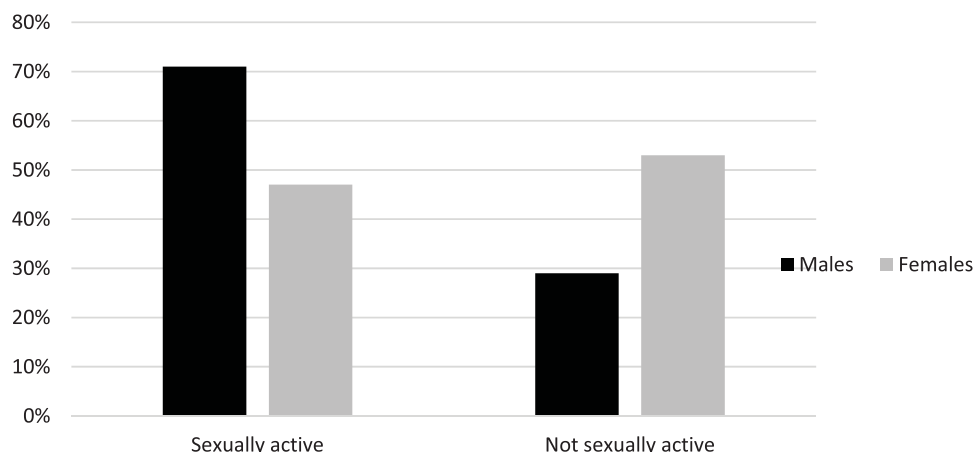


Figure 1. Percentages of males and females who are currently sexually active vs. those who are not sexually active.

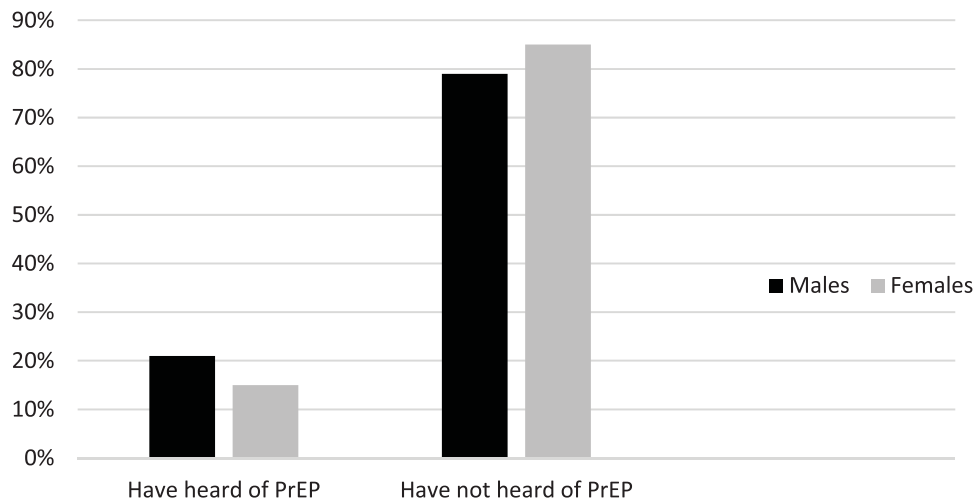


Figure 2. Percentages of males and females who have heard of PrEP vs. those who have not.

Finally, White British participants had the most positive attitudes toward PrEP ($M = 46.63$, $SD = 6.88$), followed by Mixed Heritage ($M = 45.58$, $SD = 6.39$) and Black African ($M = 44.77$, $SD = 7.68$) and White European ($M = 44.55$, $SD = 6.78$) participants. Conversely, Black Caribbeans ($M = 33.75$, $SD = 4.99$) had the least positive attitudes toward PrEP followed by the Chinese ($M = 42.54$, $SD = 4.50$) and Pakistani ($M = 43.72$, $SD = 2.57$) participants. Finally, it seems that Pakistani ($M = 36.09$, $SD = 4.23$), Black African ($M = 35.39$, $SD = 5.95$), Indian ($M = 34.27$, $SD = 4.27$), and White British ($M = 34.31$, $SD = 6.45$) participants show the most positive attitudes toward Black Africans while Bangladeshi ($M = 31$, $SD = 0$) and Chinese ($M = 31.64$, $SD = 3.96$) participants showed the least positive attitudes toward Black Africans. These results confirm Hypothesis 1 and demonstrate that White British and White European participants have much more positive attitudes toward gay men and toward PrEP than other ethnic groups. As such, ethnicity was included in the model.

Effects of Gender on Key Variables

Nonparametric Mann–Whitney tests showed significant effects of gender on attitudes toward gay men $U(220) = 4054.500$, $p < .0001$ and attitudes toward Black Africans, $U(220) = 4591.00$, $p = .013$. Females manifested more positive attitudes toward gay men ($M = 40.56$, $SD = 8.92$) than males ($M = 34.84$, $SD = 11.52$). Females also

manifested more positive attitudes toward Black Africans ($M = 34.78$, $SD = 4.62$) than males ($M = 33.02$, $SD = 5.44$). There was no statistically significant effect of gender on attitudes toward PrEP, $U(220) = 5454.500$, $p = .57$. These findings partially support Hypothesis 2 by demonstrating that females have more positive attitudes toward gay men and toward Black Africans than males. As such, gender was inserted in the model. However, there was no significant difference between the two genders for attitudes toward PrEP.

Effects of Religion on Key Variables

Kruskal–Wallis tests showed statistically significant effects of religion on religiosity $H(6) = 129.17$, $p < .001$ and on attitudes toward gay men $H(6) = 66.059$, $p < .001$ only. Unsurprisingly, participants who reported having no religion showed statistically significantly less religiosity ($M = 25.38$, $SD = 13.23$) than Christians ($M = 59.62$, $SD = 19.38$) and Muslims ($M = 70.78$, $SD = 13.17$), the two religions with the largest groups in the sample. In contrast, participants who reported no religion showed more positive attitudes toward gay men ($M = 42.83$, $SD = 6.61$) than Christians ($M = 37.26$, $SD = 11.34$) and Muslims who manifested the least positive attitudes toward gay men of all of the religion groups in the sample ($M = 31.46$, $SD = 9.58$). These findings support Hypothesis 3 by demonstrating that participants with no

religion have more positive attitudes toward gay men than participants who are religious. As such, religion was included in the model.

Effects of Current Sexual Activity on Key Variables

Mann–Whitney tests showed effects of current sexual activity for both religiosity $U(222) = 3475.500$, $p < .001$ and attitudes toward gay men $U(222) = 4396.500$, $p = .002$. Participants who reported being currently sexually active were less religious ($M = 44.39$, $SD = 23.84$) than those who were not currently sexually active ($M = 62.11$, $SD = 19.87$). Moreover, participants who reported being currently sexually active had more positive attitudes toward gay men ($M = 39.94$, $SD = 10.16$) than those who were not currently sexually active ($M = 36.06$, $SD = 10.51$). Since there were gender differences in being currently sexually active, this variable was also included in the model.

Effect of the Vignette Conditions on Attitudes toward PrEP

A Univariate $2 \times 2 \times 2$ analysis of variance (ANOVA) was performed with the vignette conditions of ethnicity (Black African vs. White British); gender (male vs. female), and sexual orientation (heterosexual vs. gay) as independent variables, and attitudes toward PrEP as the dependent variable. Results showed only a significant main effect of the vignette condition of gender (male vs. female) on attitudes toward PrEP, $F(1,221) = 3.96$, $p = .048$. A post-hoc test showed that participants tended to show significantly more positive attitudes toward PrEP when they were appraising vignettes depicting males ($M = 45.40$, $SD = 6.05$), independently of their ethnicity and sexual orientation, than females ($M = 43.21$, $SD = 7.11$), $t(219) = 2.28$, $p = .018$. This suggests that participants are more likely to express positive attitudes toward PrEP when it is presented as a tool for preventing HIV in men than in women. These findings partially support Hypothesis 4 – only prejudice based on gender impacts on attitudes toward PrEP. In other words, participants show more positive attitudes

toward PrEP when the recipient is a male and not a female.

Effects of Age on Key Variables

A multivariate analysis of variance (MANOVA) showed that age did not have an impact on the key variables and, thus, was not included in the model: $F(1, 214) = 0.56$, $p = .46$ for attitudes toward PrEP; $F(1,214) = 0.70$, $p = .40$ for attitudes toward gay men; and $F(1, 214) = 0.92$, $p = .54$ for attitudes toward Black Africans.

Effects of Relationship Status on Key Variables

A Kruskal–Wallis test showed statistically significant effects of relationship status only for religiosity $H(5) = 27.57$, $p < .001$ and for attitudes toward gay men $H(5) = 13.11$, $p = .020$, respectively. Married participants manifested greater religiosity ($M = 61.70$, $SD = 20.88$) and less positive attitudes toward gay men ($M = 32.40$, $SD = 10.49$) than participants in a monogamous relationship but not married ($M = 41.04$, $SD = 24.80$ for religiosity and $M = 40.49$, $SD = 10.69$ for attitudes toward gay men) and single participants ($M = 58.01$, $SD = 21.62$ for religiosity and $M = 37.48$, $SD = 10.01$ for positive attitudes toward gay men), respectively. As such, relationship status was not included in the model.

Spearman Rho's Correlations

Spearman Rho's correlations showed positive and moderate correlations between attitudes toward PrEP and attitudes toward gay men and Black Africans. This means that the more people report positive attitudes toward PrEP, the more positive attitudes they manifest toward gay men and Black Africans. Moreover, religiosity was negatively associated with attitudes toward gay men, which means that the more religiosity, the less positive attitudes toward gay men (Table 2).

Structural Equation Model

Since there are significant effects of gender, religion, and ethnicity on the key variables of this

study, they were included as independent variables in the model, with attitudes toward PrEP as a dependent variable. The variables of being currently sexually active and attitudes toward gay men and Black Africans were inserted in the model as mediators. Transformations were applied to convert data into normal. The model (Figure 3) was statistically significant with a $\chi^2(10,222) = 77.984, p < .001$. Model fit was also good with a confirmatory factor index (CFI) of >0.6 and a root mean square error of approximation (RMSEA) of 0.09.

The model showed that gender did not have a statistically significant direct effect on the variance of attitudes toward PrEP, with a $\beta = 0.07$,

$p = .33$. However, there were significant mediation pathways for gender impacting on attitudes toward PrEP. First, gender had a statistically significant direct effect on being currently sexually active with a $\beta = -0.25, p < .001$ that then had a significant impact on the variance of attitudes toward gay men, with a $\beta = -0.12, p = .048$. This, in turn, had a significant impact on the variance of attitudes toward PrEP with a $\beta = 0.24, p < .001$. Gender also had a statistically significant direct effect on attitudes toward gay men with a $\beta = -0.25, p < .001$. This meant that gender has an indirect effect on attitudes toward PrEP through the mediation effects of being currently sexually active and of one's attitudes toward gay men. Gender also had an indirect effect on attitudes toward PrEP through attitudes toward Black Africans. Indeed, gender impacts significantly on attitudes toward Black Africans, with a $\beta = -0.19, p = .004$, which, in turn, had a statistically significant impact on the variance of attitudes toward PrEP, with a $\beta = 0.23, p < .001$. In

Table 2. Correlations between key variables.

Variables	1	2	3	4
Attitudes toward PrEP score		.29**	.25**	-.084
Attitudes toward gay men	.29**		.34**	-.49**
Attitudes toward Black Africans	.25**	.34**		.090
Religiosity	-.084	-.49**	.062	

** $p < .01$.

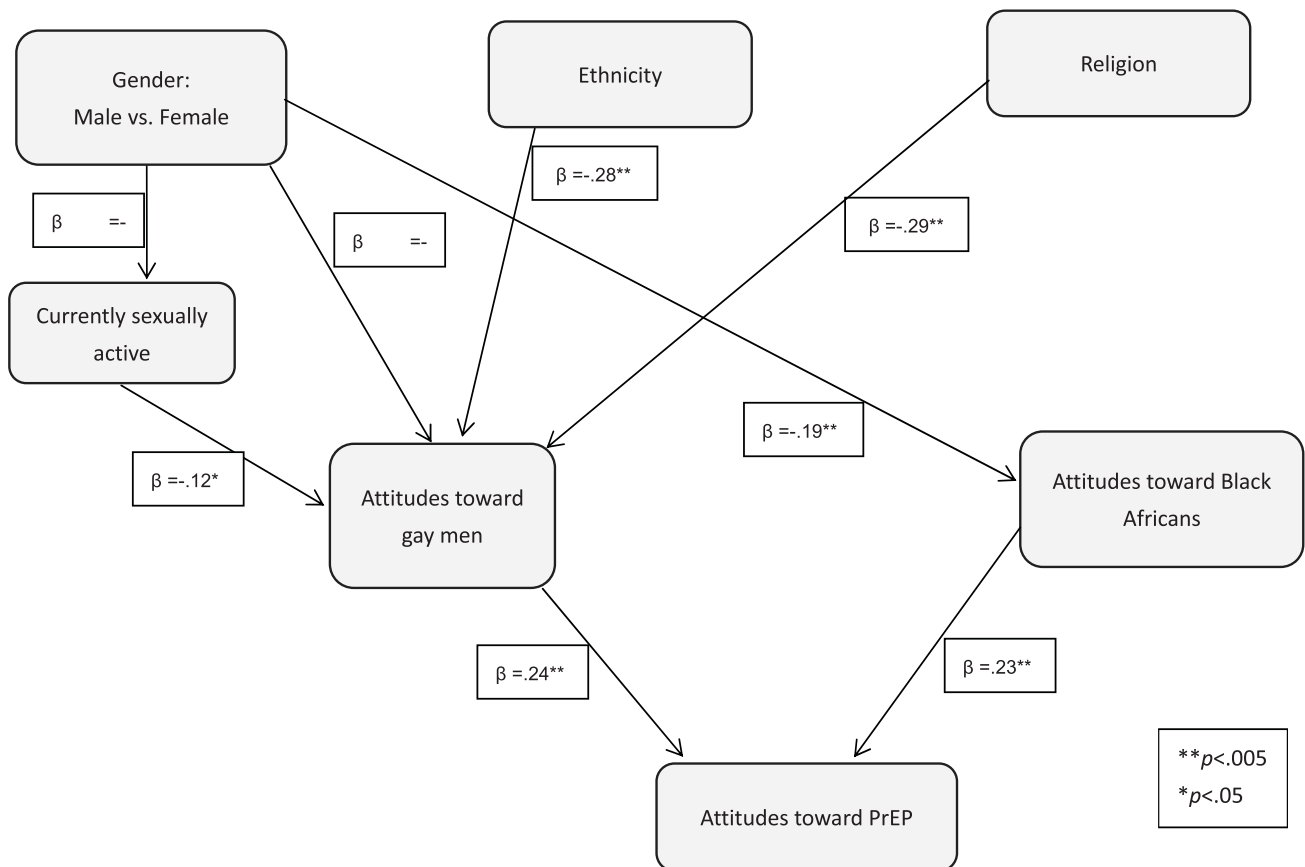


Figure 3. Structural equation model with gender, ethnicity, and religion impacting on attitudes toward PrEP through the mediators.

other words, females that were currently sexually active seemed to have more positive attitudes toward gay men and Black Africans, and both, in turn, were associated with manifesting more positive attitudes toward PrEP.

Ethnicity has statistically significant indirect pathways impacting on the variance of attitudes toward PrEP. Ethnicity did not impact directly on attitudes toward PrEP, with $\beta = -0.12$, $p = .082$. However, ethnicity did show a statistically significant indirect impact on attitudes toward PrEP through the mediation effect of attitudes toward gay men. Indeed, ethnicity impacted significantly on attitudes toward gay men, with a $\beta = -0.28$, $p < .001$, which in turn impacted significantly on the variance of attitudes toward PrEP, with a $\beta = 0.24$, $p < .001$. In other words, being of an ethnic group that has more positive attitudes toward gay men was, in turn, associated with having more positive attitudes toward PrEP.

Religion also did not have a direct statistically significant direct effect on the variance of attitudes toward PrEP, with a $\beta = 0.05$, $p = .46$. Nevertheless, like ethnicity, religion had a statistically significant indirect effect on the attitudes toward PrEP through the mediator of attitudes toward gay men. Religion impacted significantly on attitudes toward gay men, with a $\beta = -0.29$, $p < .001$, which in its turn impacted significantly on attitudes toward PrEP with a $\beta = 0.24$, $p < .001$. This meant that not having a religion was associated with more positive attitudes toward gay men, which, in turn, was associated with having more positive attitudes toward PrEP.

These findings support Hypothesis 5, and partially support Hypothesis 2, by showing that gender, ethnicity, and religion impact on attitudes toward gay men and attitudes toward Black Africans, which, in turn, impact on attitudes toward PrEP.

Discussion

The present study demonstrates the importance of social identity and prejudice in shaping attitudes toward PrEP. The structural equation model presented in this article exhibits the mediating pathways through which the independent variables of gender, ethnicity, and religion and

the dependent variable of attitudes toward PrEP are related in a diverse sample of heterosexual students in the United Kingdom. Attitudes toward gay men, attitudes toward Black Africans, and currently being sexually active were all significant mediators of these relationships.

Social Identity and Attitudes

Gender, ethnicity, and religion can be conceptualized as “big” social identity characteristics which tend to be more primordial, fixed, and enduring than attitudes, for instance. People often “essentialize” their gender and ethnicity, that is, they perceive an immutable underlying essence in relation to these social identity characteristics and, thus, believe that they are pre-determined and cannot change (Jaspal & Cinnirella, 2010; Smiler & Gelman, 2008; Williams & Eberhardt, 2008). Although the social identity of religion can change – people do leave and join religious groups – most people are born into a religious group, which, in turn, becomes entwined with other social identity group memberships (e.g., the family), and often append to the religious group membership spiritual qualities. This, in turn, can essentialize this social identity characteristic in much the same way that ethnicity is essentialized (Toosi & Ambady, 2011). Moreover, departure from one’s religious group can be highly stigmatized or, in the case of Islam for instance, prohibited by religious law.

Conversely, attitudes, though often long-standing and enduring, can potentially change. More importantly, attitudes tend to be associated with social identity group memberships – groups constitute a source of information and shape the attitudes held by group members (Terry & Hogg, 2009). Group memberships – and particularly “big” social identity characteristics, such as gender, ethnicity, and religion – determine what group members should believe and how they should think. This is observable in statements such as “boys don’t do that” or “Christians don’t say that,” etc. Furthermore, in a study of gay Muslims (Jaspal & Cinnirella, 2010), it was found that the religious group was a source of attitudes toward gay men – in other words, people opposed homosexuality because they believed

that their religion required them to do so. In support of Hypothesis 3, in this study, it was found that those with a religion were less positive toward gay men than those without a religion. Research has shown that attitudes tend to change when people depart particular groups and join others (Guimond, 1997). It is thus theoretically appropriate for these “big” social identity characteristics to be conceptualized as the predictor variables and for attitudes toward gay men and Black Africans to be conceptualized as mediators.

First, gender is an important independent variable because, following previous research into sexual attitudes (Nagoshi et al., 2008), women are generally more likely than men to manifest positive attitudes toward gay men. Furthermore, consistent with evidence of gender differences in racism (Maxwell, 2015), the present study showed that women are more likely than men to express positive attitudes toward Black Africans. Both findings were consistent with Hypothesis 2. Second, ethnicity is important because there is evidence of ethnic group differences in attitudes toward gay men (Roggemans et al., 2015), with White British participants in this sample generally expressing more positive attitudes than other ethnic groups in the sample. This is consistent with Hypothesis 1. Third, religion is a significant predictor because various empirical studies, including the present one, have demonstrated that there are religious group differences in attitudes toward gay men (Roggemans et al., 2015). In this study, those participants who reported no religion manifested the most positive attitudes toward gay men while those reporting Muslim religion manifested the least positive attitudes. Through the mediating variables of attitudes toward gay men and attitudes toward Black Africans, all of these independent variables were associated with attitudes toward PrEP. Thus, the findings of the structural equation model supported Hypothesis 5. Although the majority of participants had not heard of PrEP before, there is a long-standing association of HIV with gay men, on the one hand, and with Black Africans, on the other hand (Ipsos, 2011). Thus, positive attitudes toward gay men and Black Africans appear to be essential for individuals to support an HIV prevention option targeting these groups.

These results suggest that interventions for challenging prejudice against gay people should be targeted at ethnic minority groups in which attitudes toward gay people appear to be more negative than in the general population.

In their study of the role of prejudice in PrEP attitudes, Calabrese et al. (2016) found that participants were less supportive of PrEP funding programs when intended to benefit gay men and Black gay men, showing an underlying impact of racism and homophobia. In the present experimental study, this finding was not replicated and Hypothesis 4 was thus only partially supported. This could be attributed to the nature of this sample consisting of university students who are known to express less prejudice than other groups (Wodtke, 2012). Furthermore, given that HIV is especially associated with gay men and Black Africans in public consciousness, it is possible that participants perceived PrEP to be most advantageous for these communities and, thus, endorsed it when these groups were represented as primary beneficiaries.

Unlike Calabrese et al.’s (2016) study, the present study also manipulated the *gender* of the beneficiary of PrEP and found a main effect of gender of beneficiary on attitudes toward PrEP, with participants showing significantly more positive attitudes toward PrEP when a male was represented as benefitting from it. There appears to be a bias in the sample toward the construal of men as the most appropriate recipients of PrEP, which could be attributed to the social desirability of sexual activity in men, rather than in women (Hamilton & Armstrong, 2009). Men are often stereotyped as being more sexually active and having more sexual partners while sexual activity in women is generally stigmatized (England & Bearak, 2014). Indeed, despite empirical evidence that women are having as much sex as men (England & Bearak, 2014), in this study women reported significantly less sexual activity than men, potentially suggesting social desirability effects. In short, there appears to be a sexist approach to PrEP whereby PrEP is endorsed less for women, despite the fact that women too are at risk of HIV and can benefit from PrEP (Sophia Forum & Terrence Higgins Trust, 2018).

Limitations

There are several limitations, which should be addressed in future research into attitudes toward PrEP. First, the present study focuses on attitudes in a purposive but diverse sample of undergraduate students in Leicester in the United Kingdom. University students are less likely to hold prejudicial attitudes than other sections of the population (Wodtke, 2012). Therefore, the results of this study are not easily generalizable to the general population. However, given that significant effects are observed in this population, it is likely that they will also be observable in the general population. Moreover, Leicester, though a medium-sized, ethnically diverse city, is not representative of the United Kingdom as a whole. Thus, the present study should be replicated in other demographic groups and cities in the United Kingdom. Second, vignettes were used for the experimental manipulation in the present study, which, though advantageous in experimental survey research, should be complemented by other more sophisticated experimental manipulations in future research. This may include the use of audiovisual material in the experimental manipulation.

Conclusions

The 32% reduction in HIV incidence observed in London in 2016 can, in part, be attributed to increased uptake of PrEP in those at risk of HIV (Brown et al., 2017). PrEP is clinically effective but media censure and public disapproval of PrEP have likely led to indecision at the policy level (Jaspal & Nerlich, 2017). The results of this study show the need for greater public awareness of the benefits of PrEP in reducing HIV transmission in the United Kingdom.

A key contribution of this article is the new evidence provided that social identity and prejudice against outgroups are central to attitudes toward policies, such as PrEP, that are perceived to assist those outgroups. Furthermore, the results suggest that being female, White British, and/or having no religion is predictive of positive attitudes toward PrEP while those who are male, Black Caribbean, and/or of Muslim religion appear to be least likely to endorse PrEP.

However, a campaign to promote PrEP awareness alone is unlikely to be effective in increasing public acceptability of the prevention tool.

A significant finding from this study is that individuals must also perceive the principal beneficiaries of PrEP (i.e., gay men and Black Africans) positively to endorse PrEP for these groups. Thus, homophobia and racism must also be challenged and thus may be especially important in some groups in which there are higher levels of racism and/or homophobia. Campaigns for awareness-raising and prejudice reduction must be in tandem. Furthermore, PrEP must be presented as a tool that can benefit a wide range of groups, including women whose PrEP use was generally not endorsed by participants in the sample. The findings of this research suggest that “big” social identity characteristics are important determinants of attitudes toward PrEP.

Future research should extend these findings by measuring the strength of identification with these social identity categories. There is a need for future research into both HIV knowledge and HIV stigma in the general population and how they might impact attitudes toward PrEP. It is plausible to hypothesize that a lack of HIV knowledge could lead to decreased appreciation of the potential value of PrEP as a prevention tool. In any case, it is clear that PrEP has a vital role to play in ending the HIV epidemic in the United Kingdom. There must be an effort to actively challenge the prejudices that clearly undermine public attitudes toward this important HIV prevention tool.

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Appendix 1

Items of the Attitude toward PrEP Scale

1. [Target group] should take PrEP.
2. PrEP is likely to work.
3. PrEP will probably have serious side effects. (R)
4. [Target group] ought to be worried about PrEP. (R)
5. PrEP will be too expensive for general use.
6. The NHS should fund PrEP.
7. PrEP is an exciting breakthrough in medical science.
8. PrEP is more dangerous than good. (R)
9. PrEP will encourage [target group] to take sexual risks. (R)
10. If [target group] takes PrEP, he/she will probably stop using condoms altogether. (R)
11. If [target group] takes PrEP, he/she will probably have sex with lots of different men/women. (R)
12. [Target group] will probably take PrEP consistently.
13. The researchers who developed PrEP are to be admired.
14. I would like to learn more about this field of medical research.