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Corrigendum to: Efficacy and acceptability of 'nudges' aimed at promoting pre-exposure prophylaxis (PrEP) use: a survey of overseas born men who have sex with men

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The author advises that there was an error in affiliation D and the Correspondence address. The correct affiliation should have read:

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SHORT REPORT
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SEXUAL HEALTH

Efficacy and acceptability of 'nudges' aimed at promoting pre-exposure prophylaxis (PrEP) use: a survey of overseas born men who have sex with men

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ABSTRACT

Background. This study explores the potential for behavioural economics techniques called 'nudges' to encourage the use of HIV pre-exposure prophylaxis (PrEP) by overseas-born men who have sex with men (MSM) in Australia. We investigated the preferences of overseas-born MSM for different nudges and the effect of nudges on reported likelihood of seeking information about PrEP. **Methods.** We conducted an online survey of overseas-born MSM, in which they were asked: (1) how likely they and a relevant friend would be to click on PrEP advertisements that used behavioural economics strategies; and (2) what they most and least liked about each ad. We conducted ordered logistic regression of reported likelihood scores against participant age and sexual orientation, use of a model in an advertisement, use of statistics about PrEP, reference to the World Health Organization (WHO), rewards for seeking further information, and use of a call-to-action. **Results.** Participants ($n = 324$) reported higher likelihoods of clicking on advertisements with images of people, statistics about PrEP, rewards for seeking further information, and calls-to-action. They reported lower likelihoods of clicking on advertisements referencing the WHO. They had negative emotional responses to sexualised humour, gambling metaphors, and the slogan 'Live Fearlessly'. **Conclusions.** Overseas-born MSM prefer public health messages that feature representative messengers and statistics about PrEP. These preferences are consistent with previous data on descriptive norms (i.e. statistics about the number of peers doing the desired behaviour) and gain-framed information (i.e. focusing on what can be gained from an intervention).

Keywords: behavioural economics, descriptive norms, gain-framed information, HIV, messengers, nudge, pre-exposure prophylaxis, sexual health.

Introduction

Overseas-born gay, bisexual, and other men who have sex with men (MSM) account for an increasing proportion of HIV diagnoses in Australia. Among newly HIV-diagnosed MSM, the proportion who were born overseas has increased from 27% in 2008 to 43% in 2017.[1] Overseas-born MSM also face barriers to accessing pre-exposure prophylaxis (PrEP), an effective HIV prevention method. The cost of HIV treatment is a significant barrier for those without Medicare coverage (Australia's health insurance scheme for citizens and permanent residents). Furthermore, many lack knowledge about how to access PrEP at a cheaper price; for example by importing it.[2] Strategies informed by behavioural economics may increase knowledge of PrEP and affordable PrEP access.

Behavioural economics combines psychology and economics to better understand decision-making processes. A key application is the use of 'nudges'; i.e. behaviour change principles that postulate how changing 'choice architecture' can alter behaviour in a predictable, easy and cheap way.[3] Although nudges are used in other areas of public health, few have focused on HIV prevention.[4] We investigated the potential effectiveness and

acceptability of public health advertisements informed by behavioural economics to encourage PrEP use among overseas-born MSM.

Materials and methods

Campaign advertisement development

We held a 'nudgeathon' in September 2020 where four groups of behavioural scientists, clinicians, graphic designers and overseas-born gay and bisexual men co-designed advertisements. The advertisements aimed to promote PrEP use in overseas-born MSM and to promote educational resources on affordable PrEP access in Australia.[4]

The advertisements used four types of nudges from the MINDSPACE framework: (1) messengers (models from culturally diverse backgrounds, references to authoritative sources); (2) incentives (free PrEP starter kits, gain-framed language), (3) norms (statistics about PrEP usage); and (4) salience (sexual humour, eye-catching design).[3]

Online survey

A total of 10 advertisements were used in an online survey promoted through MSM social media and an online dating app (see Supplementary Table S1 for advertisements; see Supplementary material File S1 for survey questionnaire). It was administered between September and December 2021 using Qualtrics software (Qualtrics, Provo, UT, USA) in English. Participants were informed that the survey was voluntary and anonymous and were asked if they agreed to participate before the survey began. Participants answered questions about their age, place of birth, and sexual orientation. The only exclusion criteria was being born in Australia. Those born in Australia were unable to answer any further questions. Five randomly selected advertisements (with balancing) were presented to each participant. They were asked two questions using a seven-item Likert scale: how likely they and a relevant friend would be to click on an advertisement. They were asked to comment on what they most and least liked about each. In the raw data, a lower score implied a higher likelihood of clicking on an ad. The order of scores was inverted before analysing data. Thus, a higher regression coefficient indicates a higher likelihood of clicking.

Data analysis

Using scores from both questions, we ran univariable linear regressions for demographic variables and advertisement characteristics that received significant attention in comments. Variables with $P < 0.2$ in univariable analysis were included in an ordered logistic regression (age, sexual identity, use of a model in an ad, use of statistics about PrEP efficacy or popularity, reference to the World Health Organization (WHO), rewards for seeking further information, use of a call-to-action). Crude and adjusted odds ratios and 95% confidence intervals (CI) were reported. We used the 'MASS' package in R to conduct the regression and the 'sure' package to check for homoscedasticity, proportionality and correct specification of mean structure and link function. We used content analysis to summarise themes from comments.

The study was approved by the Human Research Ethics Committee of Alfred Hospital, Melbourne, Australia (447/21).

Results

Demographics

There were 324 participants. A full summary of demographics is in Table S2. The median age was 42 years (IQR = 33–53). Most (84.26%, $n = 273$) identified as gay. The remainder identified as bisexual (7.41%, $n = 24$), straight or heterosexual (1.23%, $n = 4$) or used a different term, no term at all or did not answer (7.10%, $n = 23$). The majority (70.68%, $n = 229$) did not specify which country outside Australia they were born in. Among those who did, 42.11% ($n = 40$) were born in Asia, 27.37% ($n = 26$) in Europe, 13.68% ($n = 13$) in North America, 7.37% ($n = 7$) in Oceania (excluding Australia), 7.37% ($n = 7$) in South America and 2.11% ($n = 2$) in Africa.

Results of the logistic regression are in Table 1. Participants aged 18–24 years and 65+ years reported higher likelihoods of clicking on advertisements than other age groups. Bisexual men reported the highest likelihoods of clicking, followed by gay men, other sexual orientations and straight/heterosexual men. The mean reported click likelihood (3.88, s.d.: 2.10) was lower than mean reported likelihood for a friend (4.09, s.d.: 1.97) with $P < 0.001$.

Advertisement characteristics

Participant preferences

The adjusted odds ratio (AOR) of reporting a higher likelihood of clicking on an advertisement was 3.17 times (95% CI: 2.62 to 3.84) as great for advertisements that featured images of people. Participants commented that images of people 'humanised' ads. They preferred models without thin, muscular, 'idealised bodies' and who were similar to them with respect to race, gender and age.

Statistics about PrEP efficacy and popularity improved reported likelihood scores (AOR: 1.94, 95% CI: 1.51 to 2.48). Two ads included statistics about the number of people who use PrEP (images 5 and 9 in Table S1) and three included statistics about PrEP efficacy (images 3–5 in Table S1).

Three advertisements (images 3–5 in Table S1) cited the WHO as an authoritative messenger (AOR: 0.72, 95% CI: 0.55 to 1.31). Some liked the reference to the WHO

Table 1. Associations between demographic variables and advertisement characteristics on likelihood to click on the advertisement ($N = 324$).

Variable	Adjusted odds ratio	95% CI	*P*-value	Crude odds ratio	95% CI	*P*-value
Age (18–24 years), bisexual, nil advertisement characteristics	1	–	–	–	–	–
Demographic variables						
Age (25–34 years)	0.67	[0.48, 0.93]	0.018	0.66	[0.47, 0.92]	0.015
Age (35–44 years)	0.61	[0.44, 0.85]	0.004	0.64	[0.46, 0.89]	0.007
Age (45–54 years)	0.68	[0.48, 0.95]	0.024	0.65	[0.46, 0.91]	0.013
Age (55–64 years)	0.66	[0.47, 0.94]	0.019	0.66	[0.46, 0.93]	0.018
Age (65+ years)	1.08	[0.70, 1.67]	0.722	1.06	[0.68, 1.64]	0.801
Age (under 18 years)	0.59	[0.23, 1.53]	0.280	0.52	[0.20, 1.34]	0.174
Bisexual	–	–	–			
Gay	0.79	[0.62, 1.00]	0.052	0.77	[0.61, 0.97]	0.028
Other	0.48	[0.33, 0.68]	<0.001	0.47	[0.33, 0.67]	<0.001
Straight/heterosexual	0.23	[0.11, 0.49]	<0.001	0.28	[0.14, 0.57]	<0.001
Advertisement characteristics						
Image of person	2.72	[1.87, 3.96]	<0.001	2.79	[2.41, 3.24]	<0.001
PrEP statistic (popularity and effectiveness)	1.94	[1.51, 2.48]	<0.001	1.60	[1.40, 1.84]	<0.001
Reward for clicking on link	1.21	[0.95, 1.58]	0.164	1.33	[1.15, 1.54]	<0.001
Call-to-action	1.02	[0.78, 1.33]	0.881	1.25	[1.08, 1.45]	0.003
WHO	0.84	[0.55, 1.31]	0.449	2.01	[1.74, 2.33]	<0.001

because they thought it was a credible source. A smaller number commented that the WHO was divisive, untrustworthy, or not interesting enough.

Participants said that they liked rewards to click-through for further information (free PrEP 'starter packs') (AOR: 1.21, 95% CI: 0.95 to 1.58). Participants also liked advertisements with a 'call-to-action' (e.g. 'Do it Now!') (AOR: 1.02, 95% CI: 0.78 to 1.33).

Participants criticised advertisements that they thought trivialised PrEP. Most participants disliked the reference to gambling in advertisement 7, which featured a slot machine saying: 'Always get lucky when on PrEP' (Table S1). One participant said: 'I'm not gambling with my health.' Many participants thought instances of sexualised humour played on stereotypes of MSM as promiscuous. One said that advertisement 2 promoted a 'stereotype that all [MSM] want is sex'. Another said that advertisement 1 made PrEP 'sound like a product for promiscuous men.' Most participants disliked vulgar language (see advertisement 2). Three advertisements (see advertisements 3–5) used the slogan 'Live Fearlessly'; some participants liked this, but others thought it 'played on fear'.

Discussion

Our data suggest that three nudge techniques can be used to encourage PrEP use among overseas-born MSM: (1) representative messengers; (2) gain-framed information; and (3) descriptive norms. Some nudges also incited negative emotional responses, potentially reducing their utility.

Information about HIV prevention is more effective if the person communicating it is similar to the target population with respect to race, gender, age and behaviour.[5] We refer to these people as 'representative messengers'. Our regression did not control for the ethnicity of models or participants, because the ethnicity of some models was unclear and we did not collect data on participant ethnicity. However, comments about the ethnicity, age and appearance of the models in our advertisements confirm the benefit of representative messengers. The finding that images of people improved the acceptability of advertisements also supports the use of lay messengers. Some participants valued information from the WHO, an expert source. However, other participants criticised the WHO and it was associated with lower scores in our regression. Heterogeneous preferences for messenger type are consistent with a meta-analysis by Durantini *et al.*, which found that suitability of expert and lay sources differs depending on the audience.[5]

Our finding that statistics about PrEP popularity and efficacy improved advertisement performance is consistent with two other behavioural economic principles: that descriptive norms influence behaviour, and that gain-framed information is effective at encouraging preventive behaviours. Descriptive norms are perceptions about who engages in a behaviour.[6] Two ads used descriptive norms in the form of statistics about the popularity of PrEP. Framing information about HIV prevention in a way that emphasises what can be

gained from doing something (compared to what can be lost by not doing it) also increases adherence.[7] All statistics about PrEP efficacy were presented in a gain-framed manner. Other factors may explain the superior performance of these ads, but our results are at least consistent with a benefit from the two nudges.

Comments provided evidence of emotional responses to different nudges (negative responses to sexual innuendo, vulgar language and the word 'fear'). Future research could expand upon our findings to better understand which nudges are most likely to elicit negative or positive emotions. Future researcher is also needed to assess the cost-effectiveness of campaign to increase PrEP use for overseas-born MSM in Australia.[8]

Our study should be read in light of some limitations. The reported likelihood of clicking on an advertisement is a limited measure of actual likelihood. People in a 'cool' or rational state could underestimate the intensity of the emotions or intuitions they will experience in a future 'hot' state.[9] Participants were arguably guided by rational considerations when asked to critique advertisements. This may not represent the state of mind of someone scrolling on a dating app, when a nudge would be applied.

To conclude, representative messengers increase the reported likelihood of accessing information about PrEP. Statistics about PrEP efficacy and popularity also increased the reported likelihood of accessing information, possibly due to the effect of descriptive norms and gain-framed information. A future national campaign will test the effect of these nudges on real-world awareness and uptake of PrEP in overseas-born MSM.

Supplementary material

Supplementary material is available online.

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Data availability. The data that support this study will be shared upon reasonable request to the corresponding author.

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