Case Study 1: HIV Self-Testing Promotion Replication

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2026-01-28

Study Objectives

The purpose of this study is to see which internet medium, between dating apps, search engines, and social media platforms, is most effective and cost efficient in increasing HIV testing among people that are at high risk (in this case minority men who have sex with men). One platform from each medium will have advertisements run on it at a given time, with the study comprising of two waves. The primary outcome will be the number of kits ordered per day, compared between each platform within each wave of advertisements. The secondary outcome will be evaluating the correlations between different attitudes towards HIV testing, medical mistrust, substance use, and general HIV related stigma and the probability that an individual orders a test.

Table 1: Participant Characteristics

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Characteristic	Value
Age in years, median (IQR)	25 (21-27)
Ethnicity, n (%)	
Hispanic/Latinx	66 (26)
Race, n (%)	
American Indian or Alaskan Native	1 (0.4)
Black or African American	196 (77.2)
White	28 (11)
Other	14 (5.5)
Multiracial	11 (4.3)

Characteristic	Value
History of PrEP uptake, n (%)	
Never taken PrEP	232 (91.3)
In the past 6 months	22 (8.7)
Number of male sex partners in the past 90 days, median (IQR)	4 (3-6)
Condom use, n (%)	
Never	36 (14.2)
Sometimes	108 (42.5)
About half the time	37 (14.6)
Most of the time	68 (26.8)
Always	5 (2)
Condomless receptive anal sex in the past 90 days, n (%)	210 (82.7)
Ever tested for HIV during lifetime, n (%)	191 (75.2)
If tested for HIV, median (IQR)	
Months since last HIV test	11 (6-21)
If not tested for HIV, n (%)	63 (24.8%)
Main reasons cited by the 63 participants for not getting tested, n (%)	
Unlikely to be exposed to HIV	8 (12.7)
Afraid of testing HIV-positive	26 (41.3)
Did not want to think about HIV/HIV-positive	8 (12.7)
Worried about names being reported if positive	3 (4.8)
Dislike for needles	5 (7.9)
Unable to trust that the results will be confidential	3 (4.8)
Unaware of where to get tested	7 (11.1)
Other reasons	3 (4.8)

Primary Analysis

Data

Table 2: Test Kit Orders by Site

Wave	Site	Days	Kits_Ordered	Rate	Site_f
1	Facebook	70	13	0.19	Facebook
1	Grindr	70	9	0.13	Grindr
1	Google	70	17	0.24	Google
2	Instagram	38	13	0.34	Instagram
2	Jack'D	38	125	3.29	Jack'D

Wave	Site	Days	Kits_Ordered	Rate	Site_f
2	Bing	38	0	0.00	Bing

Poisson Models

Estimated Rates

Table 3: Estimated Order Rates (kits/day) with 95% CI

Wave	Site_f	Estimated_Rate	SE	asymp.LCL	asymp.UCL
1	Facebook	0.186	0.052	0.108	0.320
1	Grindr	0.129	0.043	0.067	0.247
1	Google	0.243	0.059	0.151	0.391
2	Instagram	0.342	0.095	0.199	0.589
2	Jack'D	3.289	0.294	2.761	3.920
2	Bing	0.000	0.000	0.000	Inf

Pairwise Comparisons

Wave 1

Table 4: Wave 1 Pairwise Comparisons

contrast	ratio	P_unadjusted	P_Hochberg
Facebook / Grindr	1.444	0.396	0.467
Facebook / Google	0.765	0.467	0.467
Grindr / Google	0.529	0.123	0.369

Wave 2

Table 5: Wave 2 Pairwise Comparisons

contrast	ratio	P_unadjusted	P_Hochberg
Instagram / Jack'D	1.040000e-01	0.000	0
Instagram / Bing	6.307148e+10	1.000	1
Jack'D / Bing	6.064565e+11	0.999	1

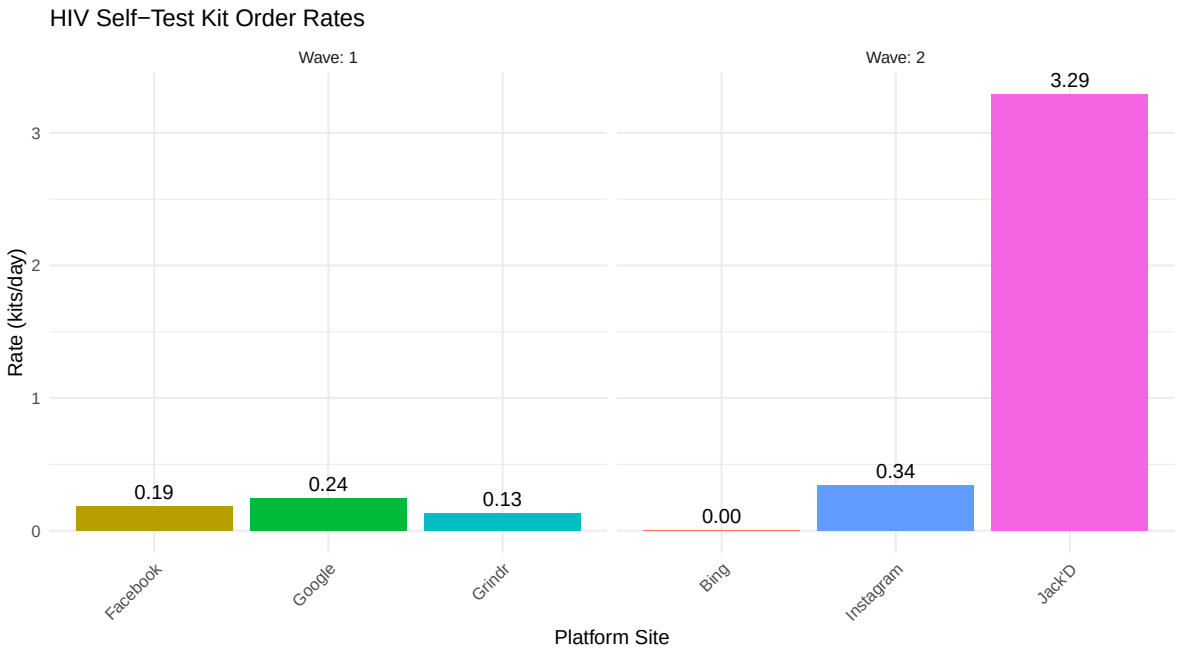
contrast	ratio	P_unadjusted	P_Hochberg

Summary Table

Table 6: Replicated vs Reported P-values (Hochberg-adjusted)

Wave	Comparison	Replicated_P	Reported_P
1	Facebook / Grindr	0.467	0.59
1	Facebook / Google	0.467	0.59
1	Grindr / Google	0.369	0.59
2	Instagram / Jack'D	0.000	<0.001
2	Instagram / Bing	1.000	0.002
2	Jack'D / Bing	1.000	<0.001

Visualization



Secondary Analysis

Table 7: Complete Secondary Analysis Results (All Sections a-f)

Domain	Item	Replicated_RR	Reported_RR	Difference
a. Substance Use	Alcohol	0.416	0.350	0.066
a. Substance Use	Cannabis	0.108	0.096	0.012
a. Substance Use	Stimulants	0.299	0.299	0.000
a. Substance Use	Sedative	0.766	0.722	0.044
a. Substance Use	Prescribed stimulant	0.702	0.727	0.025
b. Stage of Change	Stage of change for HIV testing (Q15_1)	0.251	0.251	0.000
c. HIV Testing Attitudes	Getting tested for HIV helps people feel better	0.160	0.160	0.000
c. HIV Testing Attitudes	Getting tested for HIV helps people from getting HIV	0.717	0.717	0.000
c. HIV Testing Attitudes	People in my life would leave if I had HIV	0.035	0.035	0.000
c. HIV Testing Attitudes	People who tested positive for HIV should hide it	0.825	0.825	0.000
c. HIV Testing Attitudes	I would rather not know if I have HIV	0.463	0.463	0.000
d. HIV Treatment Attitudes	I am less threatened by the idea of being HIV positive	0.421	0.421	0.000
d. HIV Treatment Attitudes	I am less worried about HIV infection	0.400	0.399	0.001
d. HIV Treatment Attitudes	I think HIV/AIDS is less of a problem	0.413	0.413	0.000
d. HIV Treatment Attitudes	I think HIV/AIDS is less serious threat due to treatments	0.225	0.225	0.000
d. HIV Treatment Attitudes	I am much less concerned about becoming HIV positive	0.274	0.274	0.000
d. HIV Treatment Attitudes	Condom use less necessary now with treatments	0.971	0.971	0.000
d. HIV Treatment Attitudes	HIV positive person needs less condom use	0.064	0.064	0.000

Domain	Item	Replicated RP	Reported RP	Difference
d. HIV Treatment Attitudes	Condom use less needed, can start treatments	0.767	0.767	0.000
d. HIV Treatment Attitudes	HIV positive using treatments can be cured	0.199	0.199	0.000
d. HIV Treatment Attitudes	New treatments can eradicate virus from body	0.029	0.029	0.000
e. HIV-Related Stigma	I feel afraid of people living with HIV/AIDS	0.613	0.613	0.000
e. HIV-Related Stigma	I could not be friends with someone who has HIV/AIDS	0.032	0.033	0.001
e. HIV-Related Stigma	People who get HIV/AIDS through sex/drug use got what they deserve	0.332	0.332	0.000
e. HIV-Related Stigma	I feel anger toward people with HIV/AIDS	0.213	0.213	0.000
f. Medical Mistrust	Be cautious with health care organizations	0.503	0.503	0.000
f. Medical Mistrust	Patients have been deceived or misled	0.413	0.413	0.000
f. Medical Mistrust	Organizations cover up mistakes	0.222	0.222	0.000
f. Medical Mistrust	Harmful experiments without knowledge	0.413	0.413	0.000
f. Medical Mistrust	Don't always keep information private	0.371	0.371	0.000
f. Medical Mistrust	Wonder if organizations know what they're doing	0.965	0.965	0.000
f. Medical Mistrust	Mistakes are common in health care	0.638	0.638	0.000

Reflection

While rates in the primary analysis were consistent, the p-values differed between the ones that I calculated and the reported ones. While wave 1 was consistent in terms of no pairwise comparisions being statistically significant, wave 2 had calculated p-values of 1 for Instagram/Bing and Jack'D/Bing whereas the paper had these pairwise comparisons being statistically significant.

The secondary analysis was almost completely consistent with the reported p-values. The three statistically significant associations, "People in my life would leave if I had HIV," "I think that new HIV/AIDS treatments can eradicate the virus from your body," and "I could not be friends with someone who has HIV/AIDS" were also statistically significant in my analysis.

References

Primary Study

Stafylis, C., Natoli, L. J., Marano, M., Charest, S., Klausner, J. D., Daskalakis, D., & Halkitis, P. N. (2022). Effectiveness of social media, dating applications, and informational search sites in promoting HIV self-testing among young sexual minority men: A comparative analysis of platform effectiveness. JMIR Formative Research, 6(9), e35648. https://doi.org/10.2196/35648

Dataset

National Institute on Drug Abuse. (2023). NIDA Clinical Trials Network: Social Media PrEP Study (CTN-0083) [Data set]. https://datashare.nida.nih.gov/study/nida-ctn-0083

##Eemeans Lenth, R. V. (2024). emmeans: Estimated marginal means, aka least-squares means (R package version 1.10.0). https://CRAN.R-project.org/package=emmeans