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Planning prompts to promote uptake of HIV services among men: a randomised trial in rural Uganda

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ABSTRACT
Introduction Interventions informed by behavioural economics, such as planning prompts, have the potential to increase HIV testing at minimal or no cost. Planning prompts have not been previously evaluated for HIV testing uptake. We conducted a randomised clinical trial to evaluate the effectiveness of low-cost planning prompts to promote HIV testing among men.

Methods We randomised adult men in rural Ugandan parishes to receive a calendar planning prompt that gave them the opportunity to make a plan to get tested for HIV at health campaigns held in their communities. Participants received either a calendar showing the dates when the community health campaign would be held (control group) or a calendar showing the dates and prompting them to select a date and time when they planned to attend (planning prompt group). Participants were not required to select a date and time or to share their selection with study staff. The primary outcome was HIV testing uptake at the community health campaign.

Results Among 2362 participants, 1796 (76%) participants tested for HIV. Men who received a planning prompt were 2.2 percentage points more likely to test than the control group, although the difference was not statistically significant (77.1% vs 74.9%; 95% CI –1.2 to 5.7 percentage points, p=0.20). The planning prompt was more effective among men enrolled ≤40 days before the campaigns (3.6 percentage-point increase in testing; 95% CI –2.9 to 10.1, p=0.27) than among men enrolled >40 days before the campaigns (1.8 percentage-point increase; 95% CI –2.3 to 5.8, p=0.39), although the effects within the subgroups were not statistically significant.

Conclusion These findings suggest that planning prompts may be an effective behavioural intervention to promote HIV testing at minimal or no cost. Large-scale studies should further assess the impact and cost-effectiveness of such interventions.

INTRODUCTION
Increasing the uptake of HIV testing services among men is essential for meeting the UNAIDS 95-95-95 targets by 2030 and ending the AIDS epidemic in sub-Saharan Africa. Since the scale-up of testing services, about one-fifth of the men living with HIV in sub-Saharan Africa remain unaware of their status. Brief community health campaigns that offer testing have shown promise as a low-cost way to rapidly increase testing coverage. Since men are less likely to participate in these campaigns and seek HIV services more generally, behavioural interventions could promote men’s uptake of such community-based HIV testing services.
Behavioural economics insights have been used to develop inexpensive ‘nudges’ and other interventions to promote a wide variety of behaviours, including organ donation, immunisation, medication adherence and HIV testing. Successful approaches include the provision of small incentives, use of defaults and deployment of reminders. These interventions encourage participants to undertake a behaviour by changing the conditions under which they make that choice while preserving their autonomy to decline. One relevant insight from behavioural economics is that people are more likely to engage in a desired behaviour in the near future when they develop an action plan for doing so. Such ‘implementation intentions’ or ‘planning prompts’ can be as simple as writing down a date and time when one will undertake the behaviour. They have been shown to generate small but meaningful increases in influenza vaccination rates in the USA and cervical cancer screening in the UK, decreases in smoking uptake among adolescents in the UK and effects on a variety of other health behaviours in various settings at no additional cost.

We conducted a randomised trial to test whether planning prompts increased men’s uptake of HIV testing at community health campaigns held in rural Uganda.

METHODS
This study was nested within another randomised trial (NCT02890459) of financial incentives to promote HIV testing that has been previously published. Between April and June 2016, we enrolled men aged ≥18 years from villages in four rural parishes in Mbarara District, Uganda. After consenting, participants responded to a questionnaire and were randomised to one of six incentive arms (gain-framed, loss-framed and lottery rewards, each worth US$1 or US$5) for undergoing free HIV testing at multidisease community health campaigns (CHCs). Randomisation was done by blocks (block size=50) with computer-generated allocation sequences before the initiation of trial enrolment by study investigators. The CHCs were to be held in participants’ communities over 2 weeks in June–July 2016. A power calculation for the parent trial was anchored at 3000 participants given budget and population size constraints in the communities; based on this sample, the parent trial had 80% power to detect a 6 percentage-point difference in HIV testing between the gain-framed group and either other incentive group (α=0.05, two-sided). In the context of an incentive-based intervention, this effect size was considered meaningfully large for scale-up. Even so, there were not enough eligible men in the parishes that met enrolment criteria for 3000 participants. For the planning prompt substudy, a two-arm trial with the final participant count had 80% power to detect a difference in HIV testing of at least 5 percentage points, which would be considered a large effect size for a nudge intervention.

Within each arm, participants were randomised (1:1) to a control group that received a calendar showing the days of the CHC or to a ‘planning prompt’ group that received the same calendar along with a suggestion that they circle the specific date and time (morning or afternoon) when they would come for an HIV test (figures 1 and 2). Participants with the planning prompt were told, ‘many people find it helpful to make a plan for when to go and get tested’, but were not required to make a selection
Plan ahead!

The community health campaign (CHC) is coming to your community in June and July. Below are the dates and locations of the CHC. Many people find it helpful to make a plan for when to go and get tested. Make your own plan by selecting a day and time below:

| Sunday | Monday | Tuesday | Wednesday | Thursday | Friday | Saturday |
|--------|--------|---------|-----------|----------|--------|----------|
| June 19 | June 20 | June 21 | June 22   | June 23  | June 24 | June 25  |
| June 26 | June 27 | June 28 | June 29   | June 30  | July 1  | July 2   |
| July 3  | July 4  | July 5  | July 6    | July 7   | July 8  | July 9   |
| July 10 | July 11 | July 12 | July 13   | July 14  | July 15 | July 16  |

**Figure 2** Calendars of community health campaign dates with and without planning prompt.

or show research assistants their selection. At the CHCs, participants received rapid HIV antibody testing by finger-prick blood collection in line with Ugandan Ministry of Health guidelines. The primary outcome of the trial was completion of HIV testing at a CHC, which was verified by fingerprint biometric measurement during both enrolment and at the CHC.

We used ordinary least squares (OLS) regression models to estimate the percentage-point change in the uptake of HIV testing due to the planning prompt. Additional multivariable models adjusted for incentive group, prize value, the interaction between incentive group and prize value, age, highest education level completed (primary or less, secondary, or more than secondary), and marital status (married/cohabitating, single, or separated/divorced/widowed). While using OLS models for binary outcomes is common in economics research, sensitivity analyses using logistic regression models were also performed and are included in the online supplemental appendix. Since previous tests of planning prompts have shown benefits when the desired action is to be taken in the near future, in post hoc subgroup analyses (by incentive arm and by testing for HIV in the past 12 months or not) were also performed and are included in the online supplemental appendix. We used α=0.05 (two-sided) as the level for statistical significance. All analyses were performed in R (V.3.6.3).

**Patient and public involvement**

Community members participated early and frequently in the design and implementation of the trial. A community advisory board (CAB) was convened prior to study initiation and its members were consulted on the study design, development of testing campaigns and interventions to promote testing. Research assistants were introduced to community leaders and had support from them during enrolment and other study activities. Health services provided as part of the study were available to all community members. Study progress and results were shared with CAB members.

**RESULTS**

We enrolled 2532 men from rural Ugandan villages in the parent trial and randomised 2362 (85%) of them to either the planning prompt group (n=1203) or the control group (n=1159) (Figure 1). Not all participants in the parent trial were randomised because the planning
prompt was implemented beginning on the fourth day of enrolment. All participants were analysed by their assigned groups, and all except one (>99%) had full data for the adjusted analyses. Participants’ characteristics were similar between the two study groups (table 1). Their mean age was 38.6 years (SD=15.9), 74% reported their highest level of completed education as primary or less and 67% were married or cohabitating. Seventy-eight per cent of participants reported having ever been tested for HIV and 38% had been tested within the past year. Overall, 1796 (76%) participants tested for HIV at a CHC. Participants in the planning prompt group were 2.2 percentage points more likely to test at the CHC than the control group, although the difference was not statistically significant (77.1% vs 74.9%; 95% CI –1.2 to 5.7 percentage points, p=0.20) (table 2). Adjusting for the incentive group to which participants were assigned in the parent trial and for key demographic characteristics (age, education and marital status), the effect of the planning prompts on HIV testing increased to 2.5 percentage points while remaining statistically insignificant (95% CI –0.9 to 5.9, p=0.15). The main adjusted model is provided in full in the appendix (online supplemental appendix table 1). Results were similar when analysed with logistic regression models (online supplemental appendix table 2).

Among 1775 participants who were enrolled >40 days before the CHC, the planning prompt increased HIV testing uptake by 1.8 percentage points (95% CI –2.3 to 5.8, p=0.39) (online supplemental appendix table 3). By

| Table 1 | Participant characteristics by randomisation to a planning prompt for HIV testing |
|---------|-----------------------------------------------|
|          | Control group No. (%)* | Planning prompt No. (%)* |
| No. of participants enrolled | 1159 | 1203 |
| Age (mean (SD)) | 38.7 (15.9) | 38.5 (15.8) |
| Education |  |  |
| Primary or less | 859 (74) | 890 (74) |
| Secondary | 207 (18) | 233 (19) |
| More than secondary | 93 (8) | 79 (7) |
| Marital status |  |  |
| Married/Cohabitating | 787 (68) | 804 (67) |
| Single | 297 (26) | 321 (27) |
| Separated/Divorced/Widowed | 75 (6) | 78 (6) |
| Daily wage (US$)† |  |  |
| Mean (SD) | 2.04 (5.32) | 1.76 (3.51) |
| Median (IQR) | 1.05 (0.60–1.79) | 0.90 (0.60–1.79) |
| Parish |  |  |
| Mabira | 371 (32) | 361 (30) |
| Ruhunga | 324 (28) | 357 (30) |
| Katyazo | 392 (34) | 410 (34) |
| Itara | 72 (6) | 74 (6) |
| Has ever had an HIV test | 899 (78) | 933 (78) |
| HIV test in the past 12 months | 459 (40) | 448 (37) |
| Perceived risk of HIV |  |  |
| No risk at all | 374 (32) | 384 (32) |
| Low risk | 522 (45) | 524 (44) |
| Moderate to high risk | 236 (20) | 267 (22) |
| Unknown risk | 26 (2) | 27 (2) |
| Likelihood of testing for HIV at a community health event in the future |  |  |
| Very likely | 1101 (95) | 1132 (94) |
| Somewhat likely | 45 (4) | 55 (5) |
| Very unlikely | 7 (1) | 5 (0) |
| Do not know | 2 (0) | 2 (0) |

*Data are no. (%), unless otherwise specified.
†Average exchange rate during enrolment period: 3344 UGX=1 US$.
behaviours. In this way, they could promote a variety of screening behaviours in addition to HIV testing, engagement of HIV-positive individuals in the treatment cascade, or caregivers’ timely vaccinations of their children. Our subgroup analyses also suggested that an important feature of planning prompts may be their proximity in time to the planned behaviour. The intervention appeared to be more effective among participants enrolled ≤40 days before the CHC than among those enrolled 41–80 days beforehand, although the effects in both groups were not statistically significant. The importance of its proximity to the CHC is consistent with the study of planning prompts in other contexts, such as influenza vaccinations, in which the intervention was provided 1–4 weeks prior to clinic days. Planning a behaviour closer to the intended date may reduce constraints in making a plan and limit derailments from achieving one’s goals.

Importantly, planning prompts are inexpensive to implement and can be easily combined with other interventions. In our study, participants would already have received a printed calendar of the CHCs and a brief explanation of the page, so the implementation of the planning prompt required only a modification of the calendar that encouraged participants to select when they would go for HIV testing. Therefore, the intervention added minimal additional cost to the parent trial. While the calendars were given to participants at their homes during enrolment in the study, other delivery methods that are minimally expensive may be possible in various settings. These include the provision of planning prompts along with informational sheets at bars and high-risk venues, through schools, churches and workplaces, as well as by community mobilisers. Other modes of implementing planning prompts, such as mailers, text messages or online schedulers, may also have applicability in some settings and should be tested further. Moreover, our study combined the planning prompts with an incentive-based intervention. In this way, a planning prompt could complement other strategies that agencies are already using.

While nudges like defaults and micro-incentives have sometimes yielded large changes in behaviour, planning prompts should be viewed as a low-cost or no-cost way to achieve small but nonetheless meaningful changes in behaviour. As a result, future studies that test planning prompts should consider using much larger sample sizes. Our study was underpowered to detect a 2 percentage-point change in HIV testing uptake, but a similar effect size in a larger study would likely be significant. Considering the low cost of using planning prompts as part of HIV service delivery, an intervention with such an effect would warrant further scale-up. As with many nudges, planning prompts are also well-suited for rapid testing with experimental designs.

Importantly, this study also contributes to ongoing discussion about the effects of nudges when implemented in a pragmatic, scalable manner by ‘nudge units’ within government agencies or hospital systems. A forthcoming review of 126 randomised controlled trials of

### Table 2  HIV testing at community health campaigns due to planning prompts

|                     | Control group | Planning prompt |
|---------------------|---------------|-----------------|
| No. of participants | 1159          | 1203            |
| HIV testing uptake  |               |                 |
| N                   | 868           | 928             |
| %                   | 74.9%         | 77.1%           |
| Unadjusted percentage-point difference* |               |                 |
| 95% CI              | Reference     | 2.2 (−1.2 to 5.7) |
| P value             | 0.20          |                 |
| Adjusted percentage-point difference† |               |                 |
| 95% CI              | Reference     | 2.5 (−0.9 to 5.9) |
| P value             | 0.15          |                 |

*Ordinary least squares regression models without adjustment.
†Ordinary least squares regression models adjusted for incentive arm (type, value and type×value) as well as participant’s age, highest completed education level and marital status.
interventions implemented at scale by two major nudge units in the USA found that the average impact of nudges was 1.4 percentage points, a meaningful and statistically significant effect for low-cost nudges. This same review found that, largely due to publication bias, randomised trials of nudges published in academic journals had a much larger effect size of 8.7 percentage points. Our results are far more consistent with the effect of nudges that are typically implemented at scale.

This study has several limitations. First, for some participants, the time between the provision of the planning prompts and the occurrence of CHCs in their communities may have been too long to maximise their effectiveness. As our findings suggest, the planning prompts may have generated a larger increase in HIV testing among those who were prompted shortly before the CHC. Second, while the study had over 2000 participants, it was not powered to detect effect sizes smaller than 5 percentage points. Since a very inexpensive intervention that increases HIV testing uptake by 2–3 percentage points would likely be considered cost-effective, larger studies that test our intervention and evaluate cost-effectiveness should be considered. These studies could confirm that planning prompts increase testing for HIV and fine-tune the conditions under which this intervention is most effective, for example, medium of delivery, wording of prompts, timing of delivery and demographic subgroups that are most receptive to prompts.

CONCLUSION
This study provides suggestive evidence indicating that ‘nudges’ such as planning prompts should be tested more widely to promote HIV prevention and treatment in sub-Saharan Africa. Financial incentives, defaults and reminders are examples for which insights from behavioural economics have been used to increase the utilisation of HIV services, and this study expands the set of interventions that should be considered for further study by researchers and programmes. Identifying and evaluating low-cost and no-cost planning prompts and other ‘nudges’ would be especially valuable to practitioners in settings with fewer resources and a greater burden of HIV.

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Competing interests None declared.

Patient consent for publication Not required.

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Data availability statement De-identified participant data and protocols are available on request to the corresponding author at thhirumull@gmail.com.

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REFERENCES
1 UNAIDS. Fast-Track: ending the AIDS epidemic by 2030. New York City: UNAIDS, 2014. https://www.unaids.org/en/resources/documents/2014/JC2688_WAD2014report.
2 UNAIDS. Unaid data 2019. New York: UNAIDS, 2019.
3 Chamie G, Clark TD, Kabami J, et al. A hybrid mobile approach for population-wide HIV testing in rural East Africa: an observational study. Lancet HIV 2016;3:e111–9.
4 Johnson EJ, Goldstein D. Medicine, do defaults save lives? Science 2003;302:1338–9.
5 Milkman KL, Beshears J, Choi JJ, et al. Using implementation intentions prompts to enhance influenza vaccination rates. Proc Natl Acad Sci U S A 2011;108:1415–20.
6 Banerjee AV, Duflo E, Glennerster R, et al. Improving immunisation coverage in rural India: clustered randomised controlled evaluation of immunisation campaigns with and without incentives. BMJ 2010;340:c2220.
7 Lester RT, Ritvo P, Mills EJ, et al. Effects of a mobile phone short message service on antiretroviral treatment adherence in Kenya (WerTel Kenya1): a randomised trial. Lancet 2010;376:1838–45.
8 Pop-Eleches C, Thirumurthy H, Habyarimana JP, et al. Mobile phone technologies improve adherence to antiretroviral treatment in a resource-limited setting: a randomized controlled trial of text message reminders. AIDS 2011;25:825–34.
9 Chamsie G, Schafer EM, Ndyabakira A, et al. Comparative effectiveness of novel nonmonetary incentives to promote HIV testing. AIDS 2018;32:1443–51.
10 Monteay JCG, Dow WH, Kaplan BC. Patient choice in opt-in, active choice, and opt-out HIV screening: randomized clinical trial. BMJ 2016;353:h6895.
11 Thaler RH, Sunstein CR. *Nudge: improving decisions about health, wealth, and happiness*. 1 edn. New Haven: Yale University Press, 2008.

12 Gollwitzer PM. Implementation intentions: strong effects of simple plans. *Am Psychol* 1999;54:493–503.

13 Sheeran P, Orbell S. Using implementation intentions to increase attendance for cervical cancer screening. *Health Psychol* 2000;19:283–9.

14 Conner M, Higgins AR. Long-Term effects of implementation intentions on prevention of smoking uptake among adolescents: a cluster randomized controlled trial. *Health Psychol* 2010;29:529–38.

15 Gollwitzer PM, Sheeran P. Implementation Intentions and Goal Achievement: A Meta-analysis of Effects and Processes. In: *Advances in experimental social psychology*. Academic Press, 2006: 69–119.

16 Sheeran P, Milne S, Webb TL, et al. Implementation Intentions and Health Behaviour. In: *Predicting health behavior*. New York: Open University Press, 2005: 276–323.

17 DellaVigna S, Linos E. *Rcts to scale: comprehensive evidence from two Nudge units*. University of California Berkeley, 2020.

18 Uganda Ministry of Health. *Uganda national policy guidelines for HIV voluntary counselling and testing*. Kampala: Ministry of Health, 2005.

19 Wooldridge JM. *Econometric Analysis of Cross Section and Panel Data. second edition edition*. Cambridge, Mass: The MIT Press, 2010.

20 Galárraga O, Sosa-Rubi SG. Conditional economic incentives to improve HIV prevention and treatment in low-income and middle-income countries. *Lancet HIV* 2019;6:e705–14.

21 Thirumurthy H, Masters SH, Rao S, et al. Effect of providing conditional economic compensation on uptake of voluntary medical male circumcision in Kenya: a randomized clinical trial. *JAMA* 2014;312:703–11.