Money, Masculinity, and Men's Health: Experimental Evidence on Demand for a Preventive Health Input

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First Draft: May 2015

Current Version: January 2017

Abstract

A fundamental puzzle about human behavior is the low level of household investment in preventive health inputs. We conducted a field experiment testing advertising strategies designed to increase demand for a life-saving preventive health technology. Offering compensation of US$10 conditional on completing a counseling session for the technology tripled uptake. Framing the basic advertisement using the statement, "Are you tough enough?", doubled uptake. Suggestive evidence indicates these advertisements reduced procrastination. Our study appears to be the first showing that a small conditional cash transfer for a one-time health clinic visit can improve individual investment in preventive health inputs.

JEL classification: I12; J13; O12
Keywords: advertising, conditional cash transfers, framing, men's health, preventive health, procrastination

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1 Introduction

A fundamental puzzle about human behavior is the low level of household investment in preventive health inputs. Worldwide, household spending on preventive health inputs is approximately 0.33% of gross domestic product (GDP) (WHO 2013). This ratio appears to be particularly low in poor countries, where household spending on preventive health inputs may be less than 0.10% of GDP (WHO 2013). Even small increases in expenditures on preventive health inputs appear to have large benefits (Jones et al. 2003, Liu et al. 2012, Walker et al. 2013, Murray et al. 2014, Say et al. 2014, Wang et al. 2014).

We conducted a field experiment in Soweto, South Africa, testing a set of advertising devices designed to increase demand for a widely available life-saving preventive health technology characterized by low uptake. This health technology, voluntary medical male circumcision (VMMC), dramatically reduces the risk of new HIV infections - the leading cause of adult mortality in sub-Saharan Africa - and is readily available in high HIV-prevalence countries in the region. Yet take-up remains low.[1] We tested three mechanisms for increasing take-up of this one-time health decision in an overlapping experimental design.

Offering compensation of approximately US$10 (i.e., South African Rand 100) conditional on completing a counseling session about VMMC approximately tripled uptake of the technology. Framing the basic advertisement with the statement, "Are you tough enough?", roughly doubled uptake. Providing statistical information about partner preference for circumcised men did not have a statistically significant effect on take-up of circumcision. Combining the messaging (i.e., "Are you tough enough?" or information about partner preference) with the cash transfer was less

[1] HIV/AIDS is the leading cause of adult mortality in sub-Saharan Africa (WHO 2011). VMMC has been shown, in three randomized trials, to reduce the likelihood of female-to-male transmission of HIV by 51 to 76% (Auvert et al. 2005, Bailey et al. 2007, Gray et al. 2007). As of the end of 2013, the fourteen World Health Organization priority countries had completed fewer than 6 million circumcisions out of the target number of approximately 21 million circumcisions (WHO 2014).

effective than the cash transfer offer by itself.

The advertising devices do not appear to have alleviated classical demand barriers such as high price, lack of information, low income, or credit constraints. We offered VMMC at zero sticker price in all study arms, as do most health facilities in high HIV-prevalence countries in sub-Saharan Africa, and conditioned the cash transfer on the counseling session, not the procedure. The offer of US$10 conditional on completing the counseling session was a reduction in the price of a complement to the procedure, yet the small offer amount relative to the other costs and benefits at stake suggest that the mechanisms underlying the effectiveness of the compensation treatment did not rely on a classical cross-price effect. HIV prevention benefits were relatively widely known in this setting at baseline, so all study arms (including a control advertising device) provided basic information about these prophylactic benefits, and the partner preference information treatment had little effect on behavior, indicating that the advertising likely did not affect behavior through an information channel. Moreover, the "Are you tough enough?" message increased demand for the health technology even though the message has zero informational content and did not change any prices.

Although we cannot fully rule out an income effect as the mechanism by which the offer of US$10 increased demand for the health technology, the implied income elasticity of demand is implausibly high. Similarly, although we cannot fully rule out the possibility that the offer of US$10 increased demand by relaxing credit constraints, the relatively small offer amount, the relatively small opportunity cost of forgone labor due to the three-day recovery period, and the fact that just under half of our sample reported having worked in the last 7 days suggest that income and credit constraints were not the primary barriers.[2] Furthermore, the "Are you tough enough?" message increased demand for the health technology despite the message not affecting income or credit constraints.

[2]US$10 is approximately one-half of one day's wages.

Instead, as we discuss in Section 5, the advertising devices may have caused procrastinating men to act on latent demand for the health technology. Survey results from study participants who responded to the advertising by attending VMMC counseling sessions indicate that these men had been considering VMMC, yet they had not previously acted on this demand. Consistent with a procrastination explanation, in each treatment arm close to 90 percent of men who attended a counseling session chose to complete the VMMC procedure. These facts suggest that a key barrier to take-up, which can be addressed through inexpensive interventions, may be a behavioral bias (procrastination), rather than a classical demand factor such as opportunity cost.

The primary contribution of this study is to the economic literature on conditional cash transfers for preventive health. It also contributes to several other literatures in economics including those on framing, identity, procrastination, partner involvement in human capital investments, and men's health.

Several studies have examined the effects of cash transfers for preventive health. One body of literature (e.g., Fernald et al. 2008, Barham and Maluccio 2009) finds evidence of improvements in health from conditional cash transfers (CCTs) for a combination of children's schooling, preventive health inputs such as vaccinations, mother's health education, and children's health outcomes such as adequate weight gain (i.e., CCTs such as Mexico's *Oportunidades* and Nicaragua's *Red de Proteccion Social* (*RPS*)). The bundling of conditionalities and the large magnitude of the transfers relative to household incomes make it difficult to separate substitution effects and income effects in the analysis of these programs.[3] Another body of literature (e.g., de Walque et al. 2012, Thirumurthy et al. 2014, Attanasio et al. 2015, Evens et al. 2016) finds evidence that CCTs for preventive health behaviors increase the likelihood of individuals engaging in those behaviors.

[3]The transfers in these combined CCTs typically are large. For example, *Oportunidades* beneficiaries receive approximately one-fifth of their income from program cash transfers (Levy 2006). Likewise, Barham and Maluccio (2009) report that the average beneficiary household in their *RPS* sample received transfers equal to nearly one-fifth of average household expenditures.

A broader body of literature (e.g., Duflo 2000, Duflo 2003, Gertler 2004, Baird et al. 2011, Cunha 2014, Aizer et al. 2016) finds evidence that unconditional cash transfers (UCTs) can also increase health inputs and improve health outcomes.[4] Three facts suggest that income effects may be the mechanism by which UCTs affect health outcomes in these studies. Unlike CCTs for health, UCTs do not directly affect the price of health inputs. In addition, the magnitude of the transfers typically are large relative to household incomes. Finally, the health outcomes (or health inputs) of interest (e.g., child anthropometric status, child anemia, teen pregnancy, food consumption) are hypothesized to be highly elastic with respect to income, particularly at the low levels of income that are standard among study participants.

Our study appears to be the first economic analysis showing that a small CCT for a one-time health clinic visit alone can increase individual investment in a life-saving preventive health input. In doing so, we present evidence that cash transfers affect behavior through a channel other than a substitution effect or income effect.

Among existing studies of cash transfers for preventive health, our study is most closely related to Attanasio et al. (2015), which examines the effect of conditionality in Colombia's *Familias en Acción* (*FeA*), yet differs in three key ways. First, we find that a CCT for a one-time clinic visit increases investment in a life-saving preventive health input, whereas Attanasio et al. (2015) finds that the conditionality of a CCT disbursed after repeated clinic visits (for prevention and treatment) increases clinic visits and has moderate effects on health outcomes. Second, the magnitude of our transfer is much smaller than the magnitude of the *FeA* transfer which was approximately US$15 per month (in 2002 dollars) and disbursed every month for conditionality compliers.[5] Third, the primary mechanism that we suggest links our

[4] At least one study (Akee et al. 2013), which analyses the effects of cash transfers from casino revenues on obesity among American Indian children in North Carolina in the United States in the 1990s and 2000s, finds that large cash transfers may harm health.

[5] Average monthly consumption among *FeA* beneficiaries was US$180 (in 2002 dollars) (Ottanasio et al. 2004).

advertising devices to increased health investment, a reduction in procrastination, presumably is much larger for adult health and for a one-time clinic visit than for child health and for repeated clinic visits.

Recent work in behavioral economics has demonstrated that minor differences in presentation can have large impacts on health and other economic investments (e.g., Bertrand et al. 2010, Dupas and Robinson 2013, Ashraf et al. 2014b, Luoto et al. 2014). This includes work on framing, in which researchers have demonstrated that how information is presented can be as important as the content in changing behavior. For example, Bertrand et al. (2010) find that including an image of a woman on a mailed advertisement for a loan increased take-up among existing bank clients as much as a 25 percent reduction in the interest rate. Another related strand of literature is work on identity economics, which models individuals as making important decisions in order to express a particular identity (e.g., Akerlof and Kranton 2000). Our study combines these ideas in demonstrating the effect of an advertising device that links a valuable health investment to a tough-guy identity.

Beginning with Strotz (1956), economists have modeled procrastination as an implication of time-inconsistent preferences. Empirically, studies have found evidence of procrastination by showing the importance of defaults and deadlines. There is evidence of procrastination leading individuals to postpone actions forever in the case of saving (Madrian and Shea 2000, Thaler and Benartzi 2004, Brune et al. 2016), submitting assignments for university coursework (Ariely and Wertenbroch 2002), and purchasing fertilizer (Duflo et al. 2008). In the case of health, procrastination has been shown to cause individuals to put off cancelling gym memberships (DellaVigna and Malmendier 2006), quitting smoking (Giné et al. 2010), immunizing children (Banerjee et al. 2010), signing up for health insurance (Barofsky 2013), and saving for health emergencies (Dupas and Robinson 2013). One qualitative study found that procrastination was reported as a factor in men not seeking VMMC (Price et al. 2014). Our study appears to be the first to find evidence

consistent with procrastination in the case of investing in a one-time, irreversible preventive health input.

A literature spanning several decades demonstrates that the gender of the decision-maker and partner involvement affect household human capital investments and other economic outcomes (e.g., Thomas 1990, Thomas et al. 1990, Duflo 2003, Ashraf 2009, Ashraf et al. 2014a). We find that providing information on partner preferences had no effect on health input take-up, raising the possibility that asymmetrical information within partnerships, one possible reason partner control over decision-making may affect outcomes, is not the main barrier to take-up of this health input.

Our study also contributes to the very small body of economic literature on men's health (e.g., Francis 2009). In addition, it expands on the preliminary analysis in Wilson et al. (2016) by examining interaction effects among the advertising devices, exploring selection into the VMMC cascade by socioeconomic and demographic characteristics, and evaluating economic explanations for the findings. Other studies have also studied barriers to and methods to increase demand for VMMC (e.g., Kim et al. 2014, Thirumurthy et al. 2014, Chinkhumba et al. 2015, Evens et al. 2016). These papers build on earlier work demonstrating low or non-existent increased risk-taking among men who are both circumcised and know about the HIV risk reduction (Wilson et al. 2014, Godlonton et al. 2016).

The paper is organized as follows. Section 2 details the design of our field experiment. Section 3 describes the data and statistical analysis. Section 4 presents the results. Section 5 discusses our findings. Section 6 concludes.

2 Experimental Design

In order to test the importance of classical and non-classical demand factors in explaining low take-up of a life-saving preventive health input, we conducted a public health advertising experiment in Soweto, Gauteng Province, South Africa. We dis-

tributed six-thousand postcards with six different overlapping designs in a random order to households encouraging men to visit any of four participating clinics for a counseling session about voluntary medical male circumcision (VMMC). Below, we describe the study setting, the way the different treatments were presented on the postcards (including the overlapping treatment design), and the postcard distribution.

2.1 Setting

The context of our study, Soweto, is an area of Johannesburg in Gauteng Province, South Africa. South Africa has the highest number of people living with HIV in the world (5.6 million) with an HIV prevalence of 17.3% (UNAIDS 2012). Estimates from 2008 indicate that HIV prevalence in Guateng Province is 10.3% (Shisana et al. 2009), approximately equal to median HIV prevalence in South Africa (Shisana et al. 2009). Urban informal settlements have the highest HIV prevalence rates in South Africa (Shisana et al. 2005). Although data is unavailable for specific settlements, following this pattern, HIV prevalence likely is higher in Soweto, a dense urban area, than in Gauteng Province as a whole. As of 2007, Gauteng Province also had the lowest rate of circumcision in the country with 25.2% of adult males circumcised (Department of Health et al. 2007). Gauteng was the site of the first randomized trial demonstrating the effectiveness of circumcision in reducing HIV infections (Auvert 2005) and at the time of our study there was widespread interest in circumcision for HIV prevention.

2.2 Treatment and control arms

We designed advertising devices to test three main marketing strategies, each addressing a specific possible demand barrier. The first advertising device was an offer of compensation of South African Rand 100 (approximately US$10), conditional on completing the counseling session about VMMC at one of the four participat-

ing clinics. This amount is approximately one-half of one day's wages in the area, although unemployment is high (Magruder 2012).

The second advertising device provided information about partners' preferences. Based on an earlier survey among women in South Africa (Simbayi et al. 2011), these postcards included the statement "A recent national survey of women in South Africa conducted by the Human Sciences Research Council showed that 2 out of 3 female partners of uncircumcised men would prefer that their partner be circumcised."

The third advertising device was designed to appeal to a desire to assert a tough-guy identity by including the question, "Are you tough enough?" This, like the other advertising devices, was included in addition to the general information (described below) presented on all postcards.

We implemented these devices in an overlapping design, yielding six distinct postcards. Table 1 illustrates our overlapping design. As listed in Column (2), two-thousand postcards included the message about partner preferences (one-thousand postcards with the compensation offer and one-thousand postcards without it). As listed in Column (3), two-thousand postcards included the challenge, "Are you tough enough?" (again, one-thousand postcards with the compensation offer and one-thousand postcards without it). Column (1) illustrates that one-thousand postcards included the compensation offer without the partner preference information or the challenge statement, and one-thousand postcards were control postcards that included none of the three aforementioned advertising devices.

All postcards, including the control postcard, stated that VMMC reduces HIV transmission by 51 to 76%, consistent with the existing evidence on the prophylactic benefit of VMMC (Auvert et al. 2005, Bailey et al. 2007, Gray et al. 2007). They listed the four participating clinics and the days when each one would be open as well as the expiration date of August 29, 2014 (i.e., approximately 2 months after postcard distribution) for any compensation provided through the postcard. All

postcards also stated that to redeem the postcard, an individual must be male and at least 18 years old, and indicated that the postcard was part of a research project studying VMMC decisions.

In order to encourage men to bring the postcard to a clinic so that the research team could know which postcard each man had received, all postcards offered light refreshments to those who brought in the postcard. In Section 5, we discuss the role of this incentive in understanding our results.

In case men had questions about the offer and to allow us to measure an additional proxy for interest generated, all postcards also provided a number that men could call or text to speak with a VMMC counselor. Each of the six different postcard types included a different phone number so that these calls and messages could be tracked by postcard type.

2.3 Distribution

Prior to distribution, postcards were placed in sealed envelopes. The sealed envelope meant that distributors would not know which postcard was in each envelope so they would be less tempted to select who got which postcard. Each envelope had a number on it that referred to a pre-specified and randomized order. This order randomized each of the six postcard types into each sequential set of six. In this way, we stratified the sample based on distribution timing, location, and the identity of the distributor.

Distributors were then instructed to hand out the postcards in the pre-specified order indicated on the envelopes to every fifth household, starting at different points where they would not overlap with each other. They were given detailed instructions about flipping a coin at each intersection to choose which direction to turn and which side of the street to follow. At each house, they were to give the postcard to a man if he was present or to a woman if a man was not present. If no adult was present, the distributor continued to the fifth house after the empty one.

3 Data and Statistical Analysis

The primary analysis reported in this paper is based on records of take-up of the hotline, the counseling session about VMMC, and the VMMC procedure itself. Below, we describe how each of these was collected and how the analysis was implemented.

3.1 Data collection

Phone calls and text messages for more information came to six different phones with six different SIM cards, one for each type of postcard. A trained VMMC counselor recorded the timing of each call. Then this counselor responded to each request, answered any questions, and asked the men if they would be willing to answer a short survey. Once consent was obtained, this survey was administered. This survey was similar to the longer survey conducted with those who came to the clinics. However, we were only able to complete 67 surveys, and thus we have not used this survey data. In total, 125 calls and texts came to these phones during the experimental period.

Trained clinical staff recorded a register of information for each individual who brought a postcard to a participating clinic. This included which postcard was brought, whether the counseling session was completed, and whether a circumcision was performed. In total, 123 men brought postcards to one of the four clinics by the expiration date. Counseling sessions were offered on arrival and men were offered the opportunity to complete the VMMC procedure at the same visit or at a later date. All 123 of these men completed the counseling and 110 underwent VMMC, all of whom did so the same day as the counseling session.

In addition, men who brought postcards to participating clinics were also asked to participate in a survey about demographic characteristics, knowledge of circumcision, previous risk-taking, and risk preferences. Table 2 presents summary statistics based on these surveys. The respondents' mean age was twenty-nine years old, the vast majority had attended secondary school, approximately one-half were em-

ployed, and the nearly all were sexually active.

3.2 Statistical analysis

Our primary analysis relies on ordinary least squares (OLS) regression. We compare the take-up of the hotline, the counseling session, and the circumcision procedure among those who received a particular advertising device with those who did not in three ways.

For each demand step, we first examine take-up among those who received a simple treatment postcard with a single advertising device relative to those who received the pure control postcard. In these regressions, each sample consists of two-thousand postcards (i.e., one-thousand treatment and one-thousand control postcards). For example, we compare the one-thousand postcards offering compensation without any additional message to the one-thousand pure control postcards. We estimate the following equation:

$$Y_i = \alpha + \beta * Treat_i + \epsilon_i \tag{1}$$

where Y_i is an indicator variable equal to one if postcard i was returned to a given step in the VMMC cascade, $Treat_i$ is an indicator equal to one if postcard i included a particular advertising device, and ϵ_i is an idiosyncratic error term. The coefficient of interest, β, is equivalent to the difference in means and the p-value of this coefficient is equivalent to that in a t-test of the significance of the difference in the two means.

The second set of regressions measure the difference in means between all of those who received a postcard with a given advertising device and all of those who received a postcard without it. That is, the estimating equation is the same as above, but the comparison samples are different. In our second set of regressions, we include those postcards with and without additional advertising devices. For example, we

compare take-up among all compensation postcards (i.e., pooling compensation-only, compensation-partner preference, and compensation-challenge postcards) to take-up among all postcards not offering compensation.

After using these two methods to examine each of the three demand steps, we estimate fully interacted, pooled regression models. These regressions test for interaction effects among the advertising devices (e.g., compensation and challenge). We estimate them using the following equation:

$$\begin{aligned} Y_i = \alpha + \beta_1 * Comp_i + \beta_2 * PartPref_i + \beta_3 * Chall_i \\ + \beta_4 * Comp_i * PartPref_i \\ + \beta_5 * Comp_i * Chall_i + \epsilon_i \end{aligned} \tag{2}$$

where $Comp_i$ is an indicator variable equal to one if postcard i included compensation and the other terms are defined similarly. As in Equation (1), Y_i is an indicator variable equal to one if postcard i was returned to a given step in the VMMC cascade and ϵ_{ijt} is an idiosyncratic error term.

For each of the three demand steps, we also present figures displaying mean take-up (and 95% confidence intervals) disaggregated by each of the six distinct postcard types.

4 Results

4.1 Effects on hotline

Figure 1 presents take-up of the hotline disaggregated by study arm. Overall, hotline take-up was approximately 2 percent. The likelihood of calling or texting the hotline did not vary substantially across study group. Although take-up in the challenge-only and information-only study arms was slightly lower than in the other study

arms, these differences are not statistically significant.

Table 3 presents ordinary least squares (OLS) regression estimates of the effect of the advertising devices on hotline take-up. For each of the treatment arms, the estimates in Columns (1)-(3) correspond to the pairwise analyses in Figure 1. The estimates in Columns (4)-(6) come from regressions each estimating the effect of a given advertising device (e.g., compensation) by pooling postcards with this device as a single treatment group and comparing to the pooled group of all postcards without this device as the control group. Invariant of specification, none of the treatments appear to have increased hotline take-up relative to the control group.

4.2 Effects on counseling session

Figure 2 displays take-up of the counseling session disaggregated by study arm. Mean counseling take-up in the entire study was approximately 2 percent. Several additional facts emerge from this figure. First, adding the offer of US$10 to any postcard appears to have increased take-up of the counseling session. Take-up in the money-only arm was more than three times take-up in the control arm. Likewise, adding the offer of US$10 to either the partner preference information postcard or to the challenge postcard yielded higher take-up than the partner preference information and challenge postcards, respectively. Second, adding the challenge, "Are you tough enough?", to the control postcard doubled uptake of the counseling session. Third, adding the information that among female partners of circumcised men, 2 out of 3 would prefer that their partner be uncircumcised had no statistically significant effect on take-up of the counseling session.

Table 4 displays OLS regression estimates of the effect of the advertising devices on take-up of the counseling session. As in Table 3, Columns (1)-(3) present the pairwise comparisons and Columns (4)-(6) present the group comparisons. The pairwise comparisons in Columns (1)-(3) suggest that the compensation postcard and the challenge postcard increased counseling take-up by approximately 2.5 and

1 percentage points, respectively (statistically significant at the 1 percent and 10 percent levels, respectively), and that the information postcard did not increase take-up. The group-wise comparisons in Columns (4)-(6) support these inferences for the compensation and information postcards. In contrast, the group-wise comparison in Column (6) suggests that there was no effect of the challenge postcard on counseling take-up. As we discuss in Section 4.4, adding either sort of messaging to the compensation postcard appears to have reduced the effect of the compensation. This means that the group-wise comparisons in Columns (4)-(6) may partly reflect underlying interaction effects between advertising devices and not just the direct effects of a particular advertising device.

4.3 Effects on procedure

Figure 3 presents take-up of the procedure disaggregated by study arm. A conversion rate (i.e., probability of completing the procedure conditional on completing the counseling session) of approximately 90 percent in each treatment arm means that take-up of the procedure across study arms closely follows take-up of the counseling session.[6] The offer of US$10 approximately tripled take-up of the procedure, the challenge "Are you tough enough?" roughly doubled take-up, and the information about "2 out of 3 partners" did not have a statistically significant effect on take-up.

Table 5 displays OLS regression estimates of the effect of the advertising devices on take-up of the procedure. As in Tables 3 and 4, Columns (1)-(3) present the pairwise comparisons and Columns (4)-(6) present the group comparisons. The regression results in Table 5 are virtually identical to those in Table 4. The very high conversion rate (i.e., approximately 90 percent in each treatment arm and two-thirds in the control arm) from counseling session to procedure helps explain this consistency.

[6]The conversion rate in the control arm was 66 percent. The small number of control postcards returned to clinics means that we are unable to statistically distinguish conversion rates between the control arm and treatment arms.

4.4 Interaction effects

Table 6 tests for interaction effects between the advertising devices. Columns (1)-(3) allow for the full set of interaction effects. Columns (4)-(6) present the results of a restricted specification testing the hypothesis that adding either information or the challenge to the compensation postcard changed its effectiveness.

The results in Table 6 suggest that adding additional messaging to the compensation postcard reduced the effect of compensation on VMMC take-up. For example, as shown in Column (3), the challenge statement reduced the effect of compensation on procedure take-up by more than 50 percent (statistically significant at the 5% level). Similarly, the restricted estimate in Column (6) indicates that adding messaging reduced the effect of compensation on procedure take-up by approximately 50 percent (statistically significant at the 5% level). Although the point estimate of the compensation-partner preference interaction is not statistically different from zero, we cannot reject equality of the two compensation-messaging terms for any of the three demand steps in Columns (1)-(3) (p-values=0.91, 0.31, 0.41, respectively).

4.5 Selection

Table 7 examines possible differential selection across study arm by observable characteristics into the counseling session.[7] It displays estimates from OLS regressions of various demographic variables and risky sexual behavior on indicator variables for study arm in group comparisons (i.e., regressions corresponding to Columns (4)-(6) in Tables 3, 4, and 5). The results suggest that men in the compensation arm were older, more likely to have children, (relatively) wealthier, more likely to have a family member with HIV, and less sexually risky, compared to men in the control arm. Men in the partner preference and challenge arms were younger, less likely to have children, poorer, less likely to have a family member with HIV, and, by some

[7] An overall conversion rate of 90 percent means that the results for differential selection into the procedure are very similar.

measures more sexually risky, compared to men in the control arm. Compared to the control arm, none of these differences by treatment arm are statistically significant. We also report the results of tests (i.e., F-statistics and p-values) of differences between the coefficient estimates across treatment groups. These results reveal only one statistically significant difference between the treatment groups: men in the compensation arm completing a counseling session at a clinic were approximately 3.9 years older than men in the partner preference arm completing a counseling session at a clinic (p-value=0.05). Overall, the much smaller sample sizes than in the main analysis greatly reduce our power to detect statistically significant selection effects.

5 Discussion

The postcards appear to have caused procrastinating men to act on latent demand for this health service. Several facts support this interpretation. We begin by discussing the main competing mechanisms that would link the postcards with increased take-up of the technology, finding evidence that is inconsistent with these explanations. Then we discuss evidence directly supporting the hypothesis that the postcards alleviated procrastination.

Three main competing hypotheses for the mechanism underlying the postcard effects include a relaxation of credit constraints, increased information, and income effects. At least two key pieces of evidence are inconsistent with the credit constraint hypothesis. The "Are you tough enough?" statement doubled take-up, yet would not have affected credit constraints. Likewise, the US$10 transfer was sufficiently small (i.e., approximately one-half of one day's wages) that it seems unlikely to have reduced credit constraints enough to explain the large increase in take-up. Neither the "Are you tough enough?" statement nor the offer of US$10 included any additional informational content beyond that contained in the control postcard. Income effects seem highly unlikely as the "Are you tough enough?" statement did

not include any monetary compensation and, if the income effect hypothesis were true, the implied income elasticity of demand for VMMC in the US$10 study arm is seemingly implausibly high.[8]

Several auxiliary results from our survey analysis provide direct evidence supporting the procrastination hypothesis. More than 60 percent of men who presented a study postcard at a clinic reported discussing VMMC with their partner and more than 70 percent reported that their partner had a preference for circumcised men. An even greater fraction, 90 percent, reported that they were interested in getting circumcised, suggesting that men in the US$10 study arm did not attend a clinic with the intention to simply take the cash transfer offered conditional on the counseling session and leave without getting circumcised. Fully 100 percent of the men who chose to receive the procedure chose to do so on the same day as the counseling session, consistent with these men having a latent demand for the circumcision.

An important alternative hypothesis deserves additional discussion. One might believe that men may have attended counseling sessions with equal frequency across study arms and our results reflect differences in the incentive to bring the postcard to the counseling session conditional on attending the counseling session. Although all postcards included the offer of light refreshments for postcard holders, the US$10 postcards provided an additional incentive for returning the postcard. The fact that the "Are you tough enough?" postcard increased take-up suggests this was not the mechanism behind our results. There could have also been differences in the rates of sharing different postcards, but 89 percent of men who visited a clinic reported that they had received the postcard directly, with another 5.7 percent who had received it from family members. Despite no prohibition on postcard sharing, this leaves less

[8] A rough calculation indicates an implied income elasticity of demand for the procedure of more than 675. The percent change in quantity demanded relative to the control postcard is (3.1-0.6)/((3.1+0.6)/2)) times 100 and the percent change in income for the year is approximately 10/5000 times 100, assuming earnings of US$20 per day and 250 working days per year. As a point of comparison, Acemoglu et al. (2013) estimates the income elasticity of healthcare spending in the United States is 0.7. Baltagi et al. (2016) presents a range of estimates, none of which are much greater than 1.

than 6 percent who got the postcard from someone outside their household.

The role of procrastination is important in interpreting the implications of this study. Even if an individual plans to take an action, it is possible to procrastinate indefinitely (O'Donoghue and Rabin 1999). Even if men do not procrastinate forever, circumcising men earlier confers a much larger health benefit because for males HIV incidence peaks in the late twenties. Although reliable HIV incidence data do not exist for our study setting, they do exist for Kwa-Zulu Natal Province, a province close to Gauteng Province, where Soweto is located. In Kwa-Zulu Natal, HIV incidence per 100 person years is 2.8, 8.7, 7.6, and 1.9 among 20-24 year-olds, 25-29 year-olds, 30-34 year-olds, and 35-39 year-olds, respectively (Bärnighausen et al. 2008).

The presence of procrastination as a barrier to VMMC demonstrates that entirely non-coercive interventions can effectively increase take-up. If postcard recipients did not want to get the procedure, they could have come for the counseling session and left with the compensation. Thus, this type of intervention that incentivizes a one-time clinic visit can encourage those who are interested to make this investment in health while not coercing individuals who are not interested. This has important policy implications as international donors are unwilling to pay individuals to undergo a surgical procedure because of the risk of coercion.

Our results on the interaction between compensation and messaging suggests that including additional messaging on the compensation offer inhibited the demand response. This contrasts with some of the existing evidence on this interaction (e.g., Ashraf et al. 2014c). One explanation for this difference is that our messaging may have been less informative than information provided in other studies and simply displaced attention from the compensation offer.

Our calculations indicate that the offer of a conditional cash transfer for completing the VMMC counseling session would be a highly cost effective method of preventing new HIV infections at scale. We estimate that that this intervention would

cost approximately US$500 to US$1500 per HIV infection averted (HIA) at scale, or the cost equivalent of approximately five years of antiretroviral therapy.[9] Existing cost-effectiveness meta-analyses of HIV prevention interventions (e.g., Hogan et al. 2005, Galárraga et al. 2009) focus on the cost of service provision and do not measure costs associated with ensuring service take-up, so there appears to be little existing evidence on the cost-effectiveness of any sort of analogous intervention to increase take-up of a HIV prevention intervention.[10]

Traditional CCT programs often suffer from high administrative costs, as high as 30 to 60 percent of total costs for programs such as *RPS* and *Oportunidades* (Benhassine et al. 2015). UCT programs aimed at increasing the likelihood of a particular behavior such as schooling may suffer from high non-compliance (Baird et al. 2010). Our cash transfer program required few administrative inputs aside from postcard printing and distribution (which would have a low unit cost at scale), and non-compliance with the desired behavior conditional on receiving cash was only 10 percent.

The effect of our CCT for the VMMC counseling session on VMMC take-up is remarkably similar to the effects reported in Thirumurthy et al. (2014) and Evens et al. (2016). In field experiments conducted in Kenya, Thirumurthy et al. (2014) and Evens et al. (2016) offered economic compensation of approximately US$10 disbursed conditional on completing the VMMC procedure and these offers approximately tripled take-up of the VMMC procedure. These similarities support the external validity of our results, yet also highlight the puzzle that the effects on procedure take-up were approximately the same across studies despite the pre-specified conditionality differing substantially in our study.

[9] For more details on this calculation, see Wilson et al. (2016).

[10] Thirumurthy et al. (2014) and Evens et al. (2016) do not report cost-effectiveness estimates, yet presumably the cost of demand creation in these studies is similar to that in ours because they find similar effect sizes for economic compensation of similar magnitudes. Thornton (2008) presents evidence indicating that willingness to receive HIV test results conditional on taking a HIV test as part of a household survey can be highly elastic with respect to the offer of a small negative price, yet reports that there is no behavior change associated with receiving these HIV test results.

6 Conclusion

Low household investment in preventive health inputs is a fundamental puzzle about human behavior. We conducted a field experiment testing several small advertising devices designed to increase demand for voluntary medical male circumcision (VMMC), a widely available life-saving preventive health technology currently characterized by low uptake. Demand for this preventive health technology appears to have been highly elastic with respect to factors outside of standard consumer demand models of health behavior. Taken as a whole, the results suggest that the advertising devices may have caused procrastinating individuals to act on latent demand for the health technology, rather than alleviating a barrier such as lack of information or credit constraints.

Our analysis illuminates several questions that future research should address. First, how do cash transfers affect behavior aside from substitution and income effects? Second, how does framing preventive health inputs affect demand for these inputs? Third, can small cash transfers for health clinic visits increase demand for other preventive health inputs, particularly those requiring a single clinic visit? Policymakers should consider cash transfers similar to ours for increasing take-up of VMMC and possibly for increasing take-up of other preventive health inputs.

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Table 1: Postcards Distributed in Overlapping Experimental Design

	No message (1)	Partner preference (2)	Challenge (3)
No compensation	N=1,000 (control group)	N=1,000	N=1,000
Compensation	N=1,000	N=1,000	N=1,000

Notes: Cell entries are number of postcards distributed. Compensation is the cash transfer offer of approximately US$10 disbursed conditional on completing the counseling sessions for voluntary medical male circumcision at a participating clinic. No message refers to no additional messaging above and beyond the basic information listed on all postcards, including the control postcard. Partner preference is the statement, "A recent national survey of women in South Africa conducted by the Human Sciences Research Council showed that 2 out of 3 female partners of uncircumcised men would prefer that their partner be circumcised." Challenge is the statement, "Are you tough enough?"

Table 2: Summary Statistics of Demographic Characteristics of Respondents

	All Respondents	Initially Uncircumcised
Age	29.03	29.07
	(9.29)	(9.36)
Single	0.64	0.64
	(0.48)	(0.48)
Has Any Children	0.47	0.49
	(0.50)	(0.50)
Worked in the last 7 days	0.46	0.45
	(0.50)	(0.50)
Has ever taken HIV test	0.77	0.75
	(0.42)	(0.44)
Has family member with HIV	0.29	0.29
	(0.45)	(0.46)
Had an STI in last 12 months	0.06	0.05
	(0.23)	(0.23)
Has ever had STI	0.11	0.11
	(0.31)	(0.31)
Has ever had sex	0.93	0.92
	(0.26)	(0.27)
Age at which first had sex	16.45	16.62
	(2.96)	(2.94)
Used a condom at last sex	0.57	0.59
	(0.50)	(0.49)
Had more than 1 partner last month	0.10	0.10
	(0.30)	(0.30)
Had more than 1 partner last year	0.52	0.53
	(0.50)	(0.50)
Attended any secondary	0.93	0.92
	(0.26)	(0.27)
Believes >50% of Soweto HIV pos	0.65	0.66
	(0.48)	(0.48)
Asset Index		-0.01
	()	(1.10)
Riskiness Index		-0.38
	()	(0.46)

Note: Standard deviations in parentheses. The sample sizes in the first column range from 107-123, and in the second column, the range is 95-111.

Table 3: OLS Regression Estimates of Effect of Advertising on Hotline Take-up

	Dependent variable: Hotline take-up					
	(1)	(2)	(3)	(4)	(5)	(6)
Compensation	.004			.006		
	(.007)			(.004)		
Partner preference		-.007			-.005	
		(.006)			(.005)	
Challenge			-.008			-.009
			(.006)			(.005)
Observations	2,000	2,000	2,000	6,000	4,000	4,000

Notes: Heteroskedasticity robust standard errors in parentheses. Each column presents the results of a single regression with hotline take-up as the outcome variable and the single independent variable listed on the left. Estimates in columns 1-3 are based on simple comparisons between those receiving a postcard with the treatment listed on the left and the pure control, while estimates in columns 4-6 include compare all those with the treatment (including combined with others) with all of those without. Significantly different from zero at 99 (***), 95 (**), 90 (*) percent confidence.

Table 4: OLS Regression Estimates of Effect of Advertising on Counseling Session Take-up

	Dependent variable: Counseling session take-up					
	(1)	(2)	(3)	(4)	(5)	(6)
Compensation	.024***			.016***		
	(.006)			(.004)		
Partner preference		.002			-.002	
		(.004)			(.004)	
Challenge			.009*			.001
			(.005)			(.005)
Observations	2,000	2,000	2,000	6,000	4,000	4,000

Notes: Heteroskedasticity robust standard errors in parentheses. Each column presents the results of a single regression with counseling session take-up as the outcome variable and the single independent variable listed on the left. Estimates in columns 1-3 are based on simple comparisons between those receiving a postcard with the treatment listed on the left and the pure control, while estimates in columns 4-6 include compare all those with the treatment (including combined with others) with all of those without. Significantly different from zero at 99 (***), 95 (**), 90 (*) percent confidence.

Table 5: OLS Regression Estimates of Effect of Advertising on Procedure Take-up

	Dependent variable: Procedure take-up					
	(1)	(2)	(3)	(4)	(5)	(6)
Compensation	.025***			.015***		
	(.006)			(.003)		
Partner preference		.004			-.002	
		(.004)			(.004)	
Challenge			.010**			.001
			(.005)			(.004)
Observations	2,000	2,000	2,000	6,000	4,000	4,000

Notes: Heteroskedasticity robust standard errors in parentheses. Each column presents the results of a single regression with circumcision take-up as the outcome variable and the single independent variable listed on the left. Estimates in columns 1-3 are based on simple comparisons between those receiving a postcard with the treatment listed on the left and the pure control, while estimates in columns 4-6 include compare all those with the treatment (including combined with others) with all of those without. Significantly different from zero at 99 (***), 95 (**), 90 (*) percent confidence.

Table 6: OLS Regression Estimates of Interaction Effects of Advertising

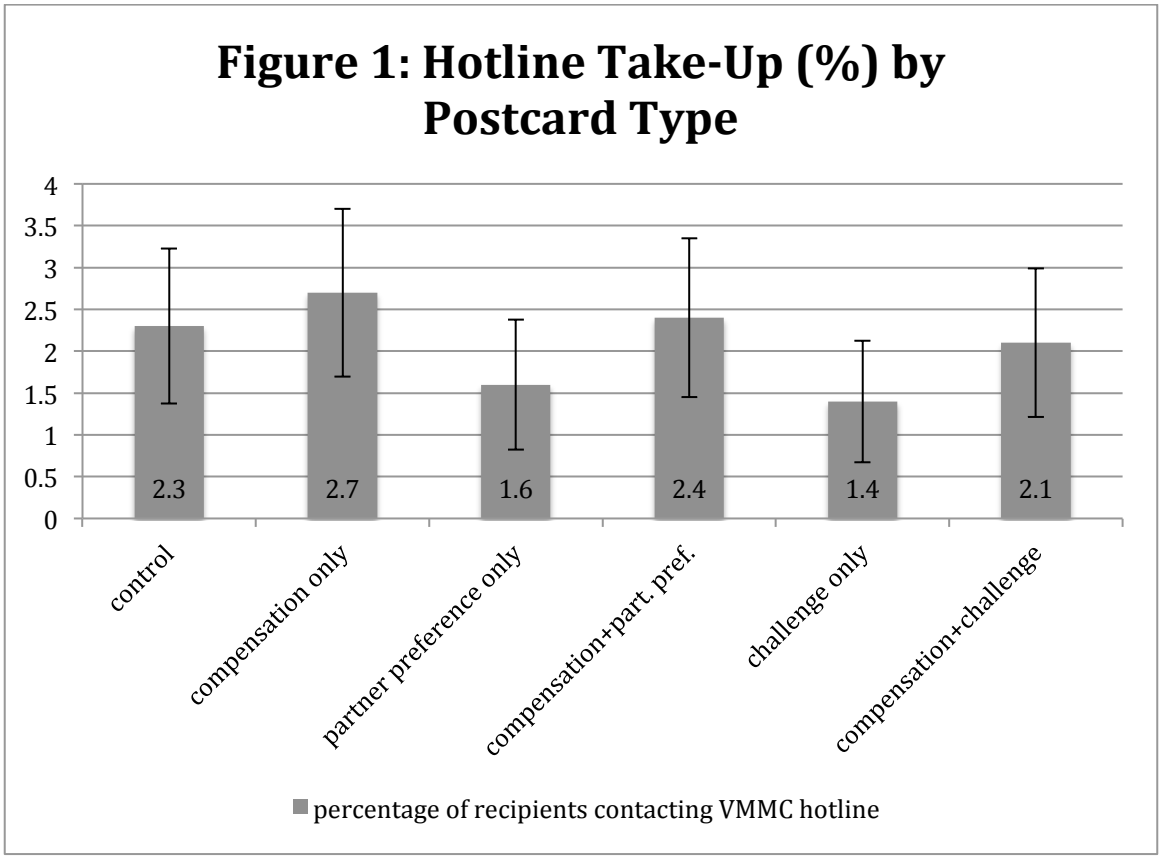
	Dependent variable					
	Hotline	Counseling	Procedure	Hotline	Counseling	Procedure
	(1)	(2)	(3)	(4)	(5)	(6)
Compensation	.004	.024***	.025***	.004	.024***	.025***
	(.007)	(.006)	(.006)	(.007)	(.006)	(.006)
Partner preference	-.007	.002	.004	-.007	.004	.006
	(.006)	(.004)	(.004)	(.006)	(.004)	.004
Challenge	-.009	.009*	.010**	-.009	.007	.008*
	(.006)	(.005)	(.005)	(.006)	(.005)	(.005)
Compensation*Partner preference	.004	-.008	-.011			
	(.009)	(.009)	(.008)			
Compensation*Challenge	.003	-.017*	-.018**			
	(.009)	(.009)	(.009)			
Compensation*(Message)				.004	-.013	-.015**
				(.008)	(.008)	(.007)
F-stat of difference	.01	1.02	.68			
(p-value)	(.91)	(.31)	(.41)			
Observations	6,000	6,000	6,000	6,000	6,000	6,000

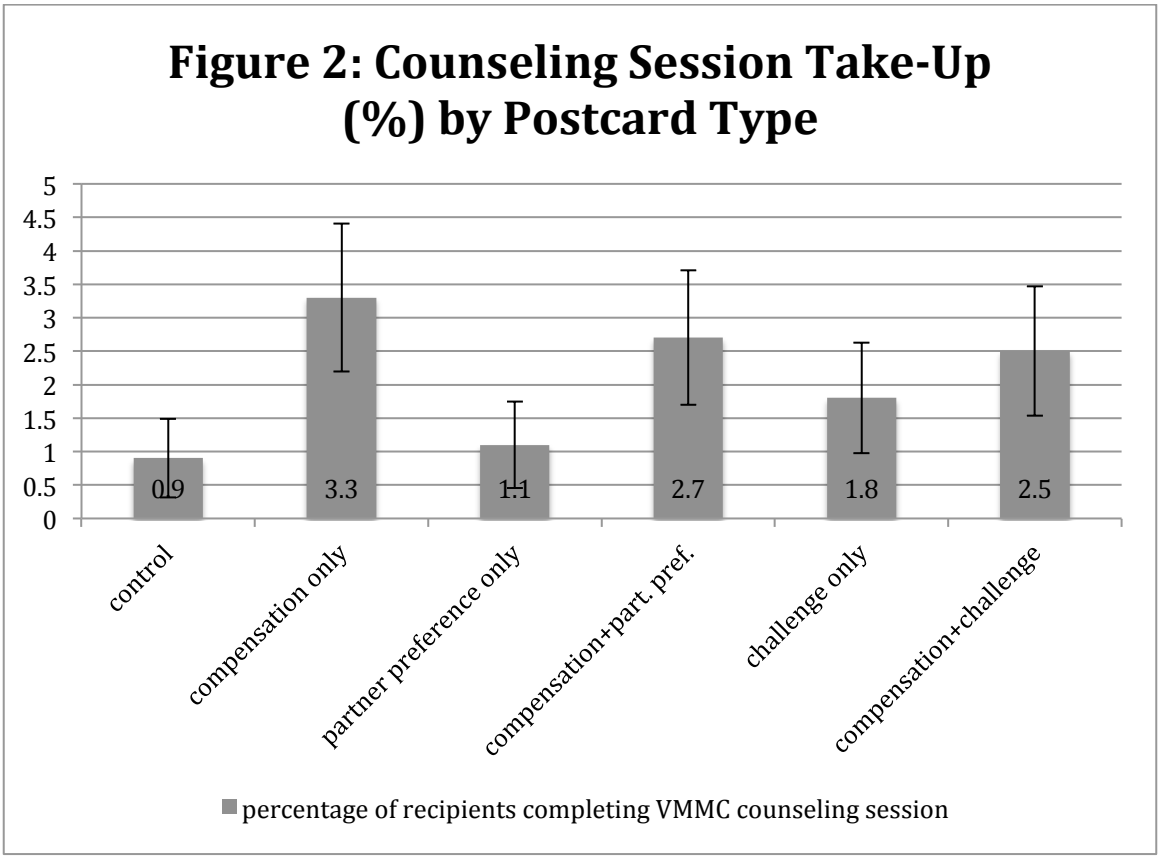
Notes: Heteroskedasticity robust standard errors in parentheses. Each column presents the results of a fully-interacted OLS regression with the outcome variables listed above. Estimates in columns 1-3 include interactions between compensation and each type of message, while estimates in columns 4-6 interact compensation with either type of message in a single variable. In columns 1-3, we report the F-stat of the difference between the coefficients on the interaction terms with the p-value in parentheses below. Significantly different from zero at 99 (***), 95 (**), 90 (*) percent confidence.

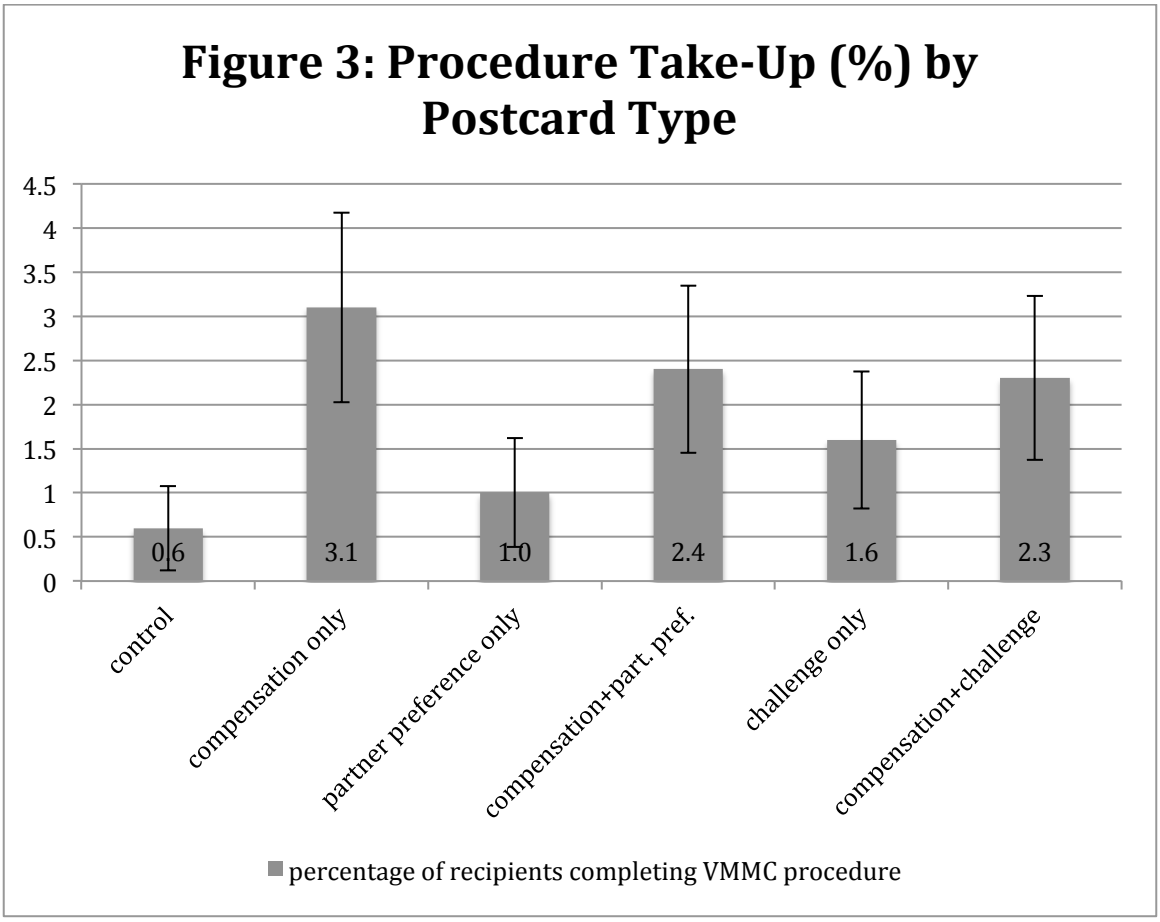
Table 7: Demographic Differences by Advertising Device

	Dependent variable					
	Age	Has children	Asset index	Family member HIV+	More than one partner last year	Risk index
	(1)	(2)	(3)	(4)	(5)	(6)
Compensation	1.91	.20	.22	.05	-.02	-.08
	(1.85)	(.21)	(.22)	(.10)	(.05)	(.10)
Partner preference	-2.88	-.15	-.16	-.18	.01	.09
	(2.08)	(.23)	(.25)	(.11)	(.06)	(.11)
Challenge	-1.25	-.02	-.02	-.05	.05	-.17
	(2.04)	(.23)	(.25)	(.11)	(.06)	(.11)
Control mean and (SD)	29.89	.55	.00	.38	.43	.00
of dependent variable	(11.94)	(.53)	(1.00)	(.52)	(.53)	(1.00)
F-stat of difference 1	3.90*	2.55	1.38	.39	.55	1.22
(p-value)	(.05)	(.11)	(.24)	(.53)	(.46)	(.27)
F-stat of difference 2	.70	1.28	.34	.14	.04	5.65
(p-value)	(.41)	(.26)	(.56)	(.71)	(.85)	(.02)
F-stat of difference 3	1.54	.55	.43	.11	.95	.74
(p-value)	(.22)	(.46)	(.51)	(.74)	(.33)	(.39)
Observations	123	119	105	123	123	121

Notes: Estimates from OLS regressions with demographic variables as outcomes and three postcard characteristics as independent variables. The sample for these estimates is the group of men who brought postcards to one of the participating clinics and completed the survey about background demographic characteristics and risk preferences. Heteroskedasticity robust standard errors in parentheses. *Has children* is an indicator for having ever fathered a child, and *Asset index* is a normalized principle component index combining electricity, tv, radio, fridge, telephone, bicycle, motorcycle, and car ownership. *Family member HIV+* is an indicator for having an immediately family member who is HIV positive or has died of AIDS. *Risk index* is a normalized principle component index combining the age at first sex, whether the respondent had sex in the last year current or previous STI infection or symptoms, having been tested for HIV, whether the respondent used a condom the last time they had sex, the number of partners in the last 1 and 12 months. We report the F-stat and p-value of a test of the difference between the coefficients. The first is the difference between the coefficients on Compensation and Partner Preference. The second is the difference between the coefficients on Partner Preferences and the Challenge, and finally the third is the difference between the coefficients on Compensation and the Challenge. Significantly different from zero at 99 (***), 95 (**), 90 (*) percent confidence.


Figure 1: Hotline Take-Up (%) by Postcard Type
4
3.5
3
2.5
2
1.5
1
0.5
0
2.3
2.7
1.6
2.4
1.4
2.1
control
compensation only
partner preference only
compensation+part. pref.
challenge only
compensation+challenge
percentage of recipients contacting VMMC hotline


Figure 2: Counseling Session Take-Up (%) by Postcard Type
5
4.5
4
3.5
3
2.5
2
1.5
1
0.5
0
0.9
3.3
1.1
2.7
1.8
2.5
control
compensation only
partner preference only
compensation+part. pref.
challenge only
compensation+challenge
percentage of recipients completing VMMC counseling session


Figure 3: Procedure Take-Up (%) by Postcard Type
4.5
4
3.5
3
2.5
2
1.5
1
0.5
0
0.6
3.1
1.0
2.4
1.6
2.3
control
compensation only
partner preference only
compensation+part. pref.
challenge only
compensation+challenge
percentage of recipients completing VMMC procedure