

Submitted Article

Vouchers versus Lotteries: What Works Best in Promoting Chlamydia Screening? A Cluster Randomized Controlled Trial

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Abstract *In this cluster randomized trial (N = 1060), we tested the impact of financial incentives (£5 voucher vs. £200 lottery) framed as a gain or loss to promote Chlamydia screening in students aged 18–24 years, mimicking the standard outreach approach to student in halls of residence. Compared to the control group (1.5%), the lottery increased screening to 2.8% and the voucher increased screening to 22.8%. Incentives framed as gains were marginally more effective (10.5%) than loss-framed incentives (7.1%). This work contributes to the literature by testing the predictive validity of Prospect Theory to change health behavior in the field.*

Key words: Incentives, Prospect theory, Framing, Field experiment, Chlamydia.

JEL codes: C93, I1.

Introduction

Policymaking has traditionally worked under the assumption that individuals are rational agents with a stable and well-defined set of preferences with which they are capable of choosing in ways that maximize their utility (Laffont and Martimort 2009). Financial incentives are proposed under this assumption: the law of demand and the relative price effect work through the use of external incentives because motivation and preferences are taken to be fixed and given (Fehr and Falk 2002; Kamenica 2012). Economic theory derives its strength from predicting how people make cost-benefit calculations and change their behavior in response to changes in incentives (Gneezy et al. 2011).

Although this framework has proved useful in many contexts, its assumptions may not always hold because people have limited cognitive abilities, are influenced by the context in which they make decisions, and are driven by emotional reactions, as well as by the opinion of others (Bowles and Polania-Reyes 2012; Gigerenzer and Gaissmeier 2011; Kamenica 2012). This

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means that the offer of financial incentives – standard tools from neoclassical economics – may not always work as expected (Ariely et al. 2009).

Behavioral economics integrates psychological insights into neoclassical economics in an attempt to address some of the descriptive limitations of standard theory (Dellavigna 2009; Heap 2013; Loewenstein et al. 2013). As such, behavioral economics assumes that financial incentives may be effective in changing behavior, but considers the importance of additional factors like the context in which incentives are offered, how incentives are framed, which type of incentive is offered, or the delivery schedule of the incentive (Rice 2013).

Applying a behavioral perspective to the analysis of economic forces does not undermine them or imply they are unimportant. The highly influential work of Thaler and Sunstein (2008), “NUDGES,” makes this point very clearly. The first letter N of NUDGES stands for incentives (Thaler and Sunstein 2008). According to Thaler and Sunstein (2008), financial incentives are powerful policy tools and the most important modifications that could be made to standard analyses of incentives are changes in salience and framing: sensible choice architects choose the right incentives for the right people in the right context.

Prospect Theory (Kahneman and Tversky 1979) provides the road map for the present study. We will test the impact of two types of incentives – a £5 voucher and a lottery ticket for £200 – framed either as a gain or a loss to promote the uptake of Chlamydia screening.

Chlamydia is the most common sexually transmitted infection (STI) in the world, and has been the leading STI in the UK since 2000 (Low et al. 2013). The largest proportion of Chlamydia cases in the UK is found among young people aged 18-25 years old living in London (Health Protection Agency 2009), and these cases account for two-thirds of all Chlamydia diagnoses in the country. Chlamydia is often referred to as the “silent infection”, as it tends to have no symptoms, but if left undiagnosed it can cause severe reproductive, skin, and visual problems.

The National Chlamydia Screening Program was introduced in England in 2003 for sexually active young people under 25 years old. The uptake of screening tests has been relatively low so far, however, despite being offered free of charge. Only 10% to 20% of young people who are eligible to perform the test actually do it (Zenner et al. 2012). Most interventions to date have tried to promote screening uptake by increasing awareness of the prevalence of the disease or by targeting practitioners with educational packages, but the effectiveness of these interventions has been negligible (Ginige et al. 2007; Guy et al. 2011). There is an increasing call for interventions that *nudge* patient health behavior in the desirable direction by tackling key motivational or contextual barriers (Schedlbauer et al. 2010; Michie and Johnson 2012), including financial incentives (Michie and Prestwich 2010).

Literature Review

Financial incentives have increasingly been used by Primary Care Trusts (PCTs) in the UK to tackle the problem of low Chlamydia screening rates (Health Protection Agency 2009). Theoretical perspectives from both psychology with operant conditioning (Martin and Pear 2007) and standard economics (Laffont and Martimort 2009) predict that incentives will increase

the likelihood of behavior *ceteris paribus*. Behaviorist principles of operant conditioning in psychology support the position that behavior is strengthened or eliminated by its positive or negative consequences. Thus, if performing Chlamydia screening would result in a reward, for example, £5, one would be more likely to comply with screening because one's behavior would be positively reinforced. Neoclassical economics provides a similar basis for generating predictions about behavioral responses to incentive offers. The law of demand and the relative price effect both support the notion that people respond to incentives because these incentives change their present calculation of costs and benefits (Frey and Jegen 2001). Chlamydia screening (as does any other type of preventive health care) creates an immediate cost, for example, travel time to take the test, physical discomfort, or fear, necessary to gain uncertain future benefits, that is, better health if the disease is detected and treated. Given that people tend to have present-biased preferences and heavily discount future benefits, the offer of a financial incentive can increase perceived immediate benefits to patients (Gneezy et al. 2011; Kamenica 2012).

Furthermore, the offer of a financial incentive may also mitigate any embarrassment associated with undergoing STI screening because the presence of an incentive allows for external attributions of behavior (Sabini et al. 2001; Burger and Caldwell 2003). The common causes reported by individuals for low screening rates are fear of stigma and embarrassment about undergoing a sexual health test, and anxiety about having to inform partners in the case of a positive result (Duncan et al. 2011; Mills et al. 2006; Richardson et al. 2010). Incentives, as a salient external stimulus, may justify behavior and act as a public validation for STI screening.

With the purpose of evaluating the impact of incentives in Chlamydia screening in the UK, Zenner and colleagues (2012) examined observational data comparing the screening rate of PCTs offering incentives with control PCTs matched by socio-demographic characteristics (population size and index of multiple deprivation) and baseline screening coverage (2007-2009). Forty-six of the 152 PCTs in England used a total of 65 incentive schemes to increase Chlamydia screening coverage. The majority of incentive offers (62%) were prize draws ranging from a £50 voucher to a £2,000 holiday trip for four. The remaining schemes used smaller incentives, such as tokens (29%) or vouchers (9%), which ranged in value from £5 to £10. Most incentives were delivered through outreach work (55%). Results showed that differences in average percentage changes in screening coverage were significant (0.43%, CI 0.04%-0.82%, $p = .03$) for voucher schemes (2.35%, $p < .0001$), but not for lotteries and draw prizes (0.16%, $p = .4$). Furthermore, the impact of vouchers was more accentuated in females (3.18%, $p < .0001$) than males (1.55%, $p = .001$).

Nevertheless, while the observational evidence from Zenner and colleagues (2012) suggested that these schemes seem to make a difference, no causal inferences can be made from these results. Other observational studies (Currie et al. 2010; Martin et al. 2012) also report a positive impact, but there is scarce experimental work to corroborate this evidence. The single instance of experimental evidence in the UK is from Low, McCarthy, and Macleod (2007), who found no impact of offering a £10 incentive. The remaining experimental study on Chlamydia screening was developed in the United States (Malotte et al. 2004). In this study, participants were offered either \$20 in cash or a \$20 grocery voucher, but only cash was

effective in promoting screening. These experimental studies raise questions about the generalizability the results from [Zenner et al. \(2012\)](#).

Although they show some degree of effectiveness, in general most incentive schemes run so far have no clear theoretical motivation. The development of theoretically-driven schemes, particularly if tested in the field, may improve our understanding of which types and framing of incentives work, as well as enhance our ability to promote health behavior changes. Our study tests an intervention based on Prospect Theory ([Kahneman and Tversky 1979](#); [Tversky and Kahneman 1992](#)), which is a descriptive theory of choice that has been used to explain and predict systematic deviations from the rational choice model in several contexts, including health ([Winter and Parker 2007](#); [Abellan-Perpinan et al. 2008](#); [Schwartz et al. 2008](#)).

We will test the impact of two financial incentives—a £5 voucher and a lottery ticket for £200—framed either as a gain or a loss. A lottery is a gamble with a low winning chance, but its small likelihood may be subjectively increased ([Aruoba and Kearney 2011](#)). People tend to be risk-seeking for gains of low probability ([Tversky and Kahneman 1992](#)), suggesting that lotteries may be potent incentives, particularly when associated with a high payoff. Although the comparison of a £5 voucher and a £200 lottery ticket cannot be taken as a direct test of the overweighing of small probabilities (this would require two lotteries with similar expected value but different probabilities), it can shed light on the impact of certain versus uncertain incentives.

Very few interventions have used incentives in the form of lotteries to promote preventive care, but these have generally reported positive results in various health settings ([Sigmon and Stitzer 2005](#); [Volpp et al. 2008](#)). The exception was the offer of lotteries in a STI context where no significant increase was found for Gonorrhoea screening ([Chacko et al. 1987](#)). This may indicate that STI screening is particularly resistant to financial incentives, and to lotteries in particular. Observational data from [Zenner et al. \(2012\)](#) found that vouchers (but not lotteries) had a positive impact in promoting screening, suggesting a preference for certainty in this context. The certainty effect ([Tversky and Kahneman 1986](#)) is related to the psychological discomfort created by risk, which leads to the perception of loss from the original probability, thus favoring a risk-aversion decision. We will provide original experimental field data of the impact of vouchers versus lotteries to promote Chlamydia screening.

Another feature of Prospect Theory, loss aversion, will be examined by framing the incentive offer either as a potential gain or as a potential loss. The concept of loss aversion is related to the fact that people are more sensitive to losses than gains of an equal value. The same outcome is valued differently if framed as the prospect of a gain or a loss in relation to some reference point. This idea, initially developed in the context of financial gambles, became very influential in health communication research since the late 1980s ([Gallagher and Updegraff 2012](#)). Message framing aims to provide a theoretically grounded development of effective health messages, mostly based on results from Prospect Theory ([Rothman et al. 2006](#)). Messages emphasizing the costs of not behaving in a healthy manner are designated as loss-framed, whereas communications highlighting the benefits of engaging in healthy behavior are referred to as gain-framed ([Rothman and Updegraff 2010](#)). Heavily influenced by the predictions of loss aversion in the case of risky financial decisions, research on health messages often assumes that loss-framed messages are more effective at

promoting behavioral change (Rice, 2013). The evidence is mixed, however, and there is no clear support for the superiority of loss-framing.

Studies tend to divide analysis by illness prevention versus detection: examples of preventive behavior are smoking cessation, safe sex or sunscreen use, while detection is related to STI screening or cancer screening. There is some consensus that gain-framed messages are more likely to encourage prevention behaviors (Kiene et al. 2005; O'Keefe and Jesen 2008, 2009; Gallagher and Updegraff 2012) but results with respect to illness detection are not conclusive. Some studies support the use of loss-framed messages to increase screening (O'Keefe and Jensen 2009; Rothman et al. 1999, 2006; Kiene et al. 2005) but more recent papers fail to find any association (Alk et al. 2011; Gallagher and Updegraff 2012).

Regarding Chlamydia screening, Urban et al. (2006) evaluated the impact of gain versus loss-framed messages with the intention to obtain screening, and reported no difference between the two types of messages. This study was based on self-reported intention to screen, and thus the impact of framing on actual Chlamydia screening rates was not shown. But if research on health message framing is extensive, the framing of incentive messages is under-researched. Patients can be offered the possibility of gaining a reward for screening and bear a loss in the absence of screening. Despite the existence of some studies about incentive framing in other settings suggesting that loss-framed incentives are stronger motivators (Etchart-Vicent and l'Haridon 2011; Madhavan et al. 2012), within health research there is scarce evidence.

Several studies compare the different impact of offering successive gains with deducting successive losses from an initial endowment, but most evidence comes from smoking cessation interventions (Gine et al. 2010). In a study by Romanowich and Lamb (2013) developed in the United States, participants could either gain \$75 per day or lose \$75 per day (initial endowment = \$375). Loss-framed participants were more likely to achieve at least one day of abstinence, and tended to reduce the amount smoked more than gain-framed participants. On the other hand, Roll and Howard (2008) found a positive effect from gain-framed incentives in smoking abstinence, and an adverse effect from loss-framing.

These limited and contradictory results about the impact of framing call for further clarifying studies. Moreover, although both studies are informative about the impact of incentive framing, both are related to long-term behavioral change, contrary to the one-shot screening moment of Chlamydia screening. The present study makes an innovative application of Prospect Theory to sexual health behavior and health interventions. By comparing the impact of a small voucher with a larger lottery – framed as a gain or a loss – we test the predictive validity of Prospect Theory to change behavior. To the best of our knowledge, this is the first attempt to examine these questions. Furthermore, our study mimics the standard outreach approach used in student halls in the UK, thus providing an estimate of the effect size for similar interventions, if implemented, with or without the offer of an incentive.

Hypotheses

We propose three hypotheses to be tested in this field study:

Hypothesis 1. The uptake of Chlamydia screening will be higher in incentivized groups. This hypothesis is derived from neoclassical economics and operant conditioning (Gneezy et al. 2011; Kleinsorge and Rinkeauer 2012)

which propose that, all things being equal, an incentive will increase the likelihood of the desired behavior.

Hypothesis 2. A £5 voucher will increase the uptake of Chlamydia screening more than a £200 lottery. The certainty effect (Tversky and Kahneman 1986) and previous observational studies using incentives in sexual health (Chacko et al. 1987; Zenner et al. 2012) suggest that a small, certain incentive will be more effective than a prize draw.

Hypothesis 3. Loss-framed incentives will be more effective than gain-framed incentives for increasing the uptake of Chlamydia screening. This hypothesis is derived from Prospect Theory and the concept of loss aversion (Kahneman and Tversky 1979; Tversky and Kahneman 1992).

Methods

Sampling and Sample Size Calculations

This paper followed CONSORT guidelines for cluster RCTs (Campbell et al. 2004). Participants in this study were individuals aged 18-24 years living in student halls in London ($n = 1,060$) and can be considered the core target population of the National Chlamydia Screening Program in the UK. Four halls from three different universities agreed to participate in this study. To avoid treatment contamination (i.e., students becoming aware of different incentives being offered to others), each hall was randomly selected to receive a different type of incentive.

Due to the clustered nature of the sample, power calculations were necessary to evaluate the design effect of the study, which is the amount by which the sample size should be multiplied. This amount depends on how much more alike individuals are within a given cluster (= hall) than those from different clusters, designated by intraclass correlation coefficient or ICC (Wade and Koutoumanou 2011). The lower the coefficient, the more individuals from different clusters are similar. There is no objective measure for the ICC in this study, and there are no similar previous studies to serve as a benchmark. We will establish ICC at .01 because although participants live in different halls, all are undergraduate students under 25 living in London with no significant age difference between halls (95% of students are within the 18-24 range, mean 20.19 SD = 2.9), and a similar mix of socio-demographic characteristics (gender and ethnicity). The average number of individuals per cluster was 265, resulting in a design effect of 3.641.¹ This would correspond to $n = 73$ per hall in a design with simple randomization, which has, at a .05 significance level, 80% ability to detect approximately a 10% uptake difference between groups.

Regarding the gain versus loss framing of the offered incentive, there was a simple randomization within-hall by room number (a coin flip determined even numbers = loss framing; odd numbers = gain framing). In each hall, only one type of incentive was offered (£5 voucher or £200 lottery), but this was framed as a gain to half of the students and as a loss to the remaining half. In the leaflet distributed to students (see procedure below) this difference is not easily detected even if students discussed the offer of the incentive among each other, because the salient features (type and size of incentive) remained the same (table 1).

¹Design effect = $1 + (\text{average number of individuals per cluster} - 1) \times \text{ICC}$

Table 1 Incentive Conditions

		Incentive Frame	
		Gain	Loss
Incentive Probability			
Certain	Receive £5 HMV voucher if returns the test		Loses £5 HMV voucher if does not return the test
Uncertain	Participate in a lottery to win £200 HMV voucher if returns the test		Loses the possibility to participate in a lottery to win £200 HMV voucher if does not return the test

Although this study has four experimental conditions (2 framing x 2 type of incentive) and control groups, only the type of incentive (voucher or lottery) required cluster randomization between halls. Therefore, the four halls were randomly selected to test the offer of the voucher, the lottery or no incentive. Since there were three intervention arms and four halls, two halls needed to have the same intervention. Random number generation allocated the interventions to the halls: the lowest number would be the control group, the second lowest number was the lottery, and the two highest numbers corresponded to the voucher offer.

Procedure

The National Chlamydia Program in the UK works mostly through opportunistic screening that occurs mostly when young people register with the National Health Service (NHS) or visit their general practitioner. Students living in halls are mostly approached through a proactive strategy by outreach organizations that offer free screening on site (Jenkins et al. 2012). Zenner and colleagues (2012) confirmed that most incentives schemes were offered through outreach work (55%); thus, this is also the strategy employed in this study.

In step one, Chlamydia information leaflets were placed under each student's individual room door. All leaflets included the standard NHS Chlamydia information that appears in NHS informational brochures related to the infection. Experimental groups received additional information about the incentive offer. The students were invited to pick up a test in their hall's reception area, perform the test in their rooms, and return it to reception on the same or next day. This direct delivery method and home testing has proven to be more effective than inviting participants to perform the test in a clinical context (Tebb et al. 2004; Cook et al. 2007) because it transmits a sense of control and privacy to patients.

The dependent variable used in this study was the return of the screening kits. Although the pick-up rates could already suggest some difference between the experimental groups, the main measure of the effectiveness of a screening program is the final completion rate of the tests. Thus, we will only be reporting on the returned screening kits.

Incentives

Individuals set budgets for spending and allocate expenses in various categories, for example, for food, accommodation, and clothing (Thaler 1999).

There is evidence that these categories are not fungible as people usually make strict budget allocations (Hastings and Shapiro 2013). When the budget for personal luxury (e.g., special dinners, expensive clothing) reaches its maximum, people usually do not transfer funds from regular accounts (e.g., household expenses, transportation). Therefore, we expect the offer of unexpected gift cards to be appealing to students, who usually live with a limited budget.

The incentives offered were HMV gift cards—HMV stands for His Master’s Voice and a leading entertainment company in the UK—in the form of either a £5 voucher or a £200 lottery. HMV is a retailing company in the area of entertainment with a range of products including audio, books, Blu-ray discs, CDs, computer software and hardware, DVDs, video games, posters, as well as an increasing range of clothing and fashion items. The £5 voucher value was chosen as a small incentive to correspond with the relatively effortless task. The £200 lottery was selected to be sufficiently engaging for students. Participants were not informed of the likelihood of winning the lottery (e.g., among how many students would the lottery be drawn), which may carry limitations in its comparison with the voucher because there are no comparable expected values. Nevertheless, in real settings involving prize draws, for example the National Lottery or Lotto, people are hardly ever informed of their probability of winning the prize. Moreover, even if the lottery does not have the same expected value as a certain voucher, the available budget of health organizations often does not bear the offer of individual incentives. Hence, although the effectiveness of the voucher and the lottery cannot be compared based on their expected value, it still holds high external validity because it reflects the reality of public health interventions.

Participants in the voucher groups received the incentive on-site upon return of the screening kit. Students performing screening in the lottery group were enrolled in a prize draw. Through random number generation, participants were randomly attributed an ID number in a Microsoft Excel spreadsheet, and the winner was selected through the random return function. The winner was informed by email and sent the £200 voucher by post.

Study Design

This study used a 2 (framing: gain, loss) × 2 (type of incentive: certain, uncertain) design with a control group (table 1).

The incentive offer was framed as follows for the “gain” interventions:

- “If you pick up the screening test and return it, you will gain a £5 HMV voucher,” (certain small gain).

- “If you pick up the screening test and return, you will gain the chance to participate in a £200 HMV voucher lottery,” (uncertain high gain).

In the “loss interventions”, students were informed that:

- “If you don’t pick up the screening test and/or don’t return it, you will lose a £5 HMV voucher,” (loss of a certain small gain).

- “If you don’t pick up the screening test and/or don’t return it, you will lose the chance to participate in a £200 HMV voucher lottery,” (loss of an uncertain high gain).

The leaflets included an image of the voucher and the amount offered in an attempt to create an endowment effect or psychological sense of ownership (Shu and Peck 2011).

Results

Incentive versus Control

Chlamydia kit return was significantly higher when financial incentives were offered, thus confirming hypothesis 1. Those who received an offer of a financial incentive – regardless of the type of incentive – were more likely to return the kit than those who did not receive an incentive offer ($\chi^2 = 20.040$ $df = 1$ $p < .001$). Only 1.5% of the students from the control group returned the kits that they had picked up, compared to 8.9% of the students that were offered incentives.

Voucher versus Lottery

Offering a voucher was more successful at leading to test kit returns than offering an opportunity to take part in a lottery (table 2). This result confirms hypothesis 2, which predicted that the voucher would be more effective than the lottery. There was a significant difference in the proportion of Chlamydia kits returned according to the type of incentive ($\chi^2 = 75.541$ $d.f. = 1$ $p < .001$), with a higher return of Chlamydia kits when a £5 voucher was offered (22.8%) compared to a £200 lottery (2.8%).

Gain versus Loss Framing

The effect of framing the incentive offer as a potential gain or loss was confirmed only at a .1 level of significance. Gain-framed incentives were marginally more effective than loss-framed incentives (10.5% vs. 7.1%; $\chi^2 = 2.589$ $df = 1$ $p = .069$). This result does not confirm hypothesis 3, which predicted that loss-framed incentives would be more effective at increasing kit return. Although the sample size does not allow a formal interaction test, a frequency analysis of returned kits per type of incentive vs. framing does not suggest an interaction (table 2). For both types of incentives there was a slightly higher return in the case of gain-framed messages, but not significant in either case (Voucher ($\chi^2 = .128$, $df = 1$, $p = .425$); Lottery ($\chi^2 = 1.192$, $df = 1$, $p = .206$)).

Gender Distribution and Kit Return

Student halls had different gender proportions ($\chi^2 = 84.811$, $df = 3$ $p < .001$), with a higher female proportion in the halls where incentives were offered. This was controlled for in the regression analysis. Gender makes no statistically significant difference regarding whether a kit was returned in the control group (male 1.1% vs. female 2% $\chi^2 = 0.463$, $p = 0.661$), but

Table 2 Returned Chlamydia Kits per Incentive vs. Framing

		Incentive Frame		All incentive vs. Control Group
		Gain	Loss	
Incentive probability	Certain	23.7%	21.6%	89% vs. 1.5% ($p < .001$)
	uncertain	3.6%	2 %	

proportionally more men than women returned screening kits when an incentive was offered (male 17.6% vs. female 8.3% $\chi^2 = 10.302$, $p = 0.002$).

We run a logit model to examine the determinants of Chlamydia screening uptake (table 3). The offer of a financial incentive was a significant predictor ($B = 2.719$, $p = .001$). The type of incentive was also a factor influencing the uptake of screening ($B = -1.180765$, $p < .001$). Control variables (hall and gender) were not significant in the logistic regression.

Discussion

This study tested the impact of financial incentives to promote Chlamydia screening in 18-24 year-old undergraduate students in a naturalistic setting, that is, student halls of residence. The offered incentive was a HMV voucher, either in the form of a £5 voucher or a £200 lottery voucher. Incentive messages were framed as either a gain (e.g., *If you pick up the screening test and return it, you will gain a £5 HMV voucher*) or a loss (e.g., *If you don't pick up the screening test and/or don't return, you will lose a £5 HMV voucher*).

Results showed that the offer of an incentive was effective at increasing the return rate of Chlamydia screening kits (8.9% of students returned their kits versus 1.5% for those with no incentive offer). This finding corroborates past observational studies (Currie et al. 2010; Martin et al. 2012; Zenner et al. 2012). It does not support the only other UK experimental study (Low et al. 2007), which found no effect of a £10 voucher.

Results also showed that offering a £5 voucher was more likely to result in a returned test kit (22.8%) than offering students a £200 lottery (2.8%). This confirms the work of Chacko et al. (1987) in the United States, who failed to find any effect of a lottery to promote STI screening. The preference for vouchers over lotteries is consistent with Zenner et al. (2012), who reached a similar conclusion using observational data. We propose that, in the case of an activity that requires an immediate effort and discomfort like a STI screening test, a certain reward is more effective. And this is particularly true for the case of young people, who are particularly driven by immediate rewards (O'Brien et al. 2011; Worthy et al. 2011). It could be argued that an uncertain gain of £200 may not be sufficiently motivating for students to perform a STI screening test. Comparing other studies that have offered lotteries to promote health behavior (e.g., Yokley and Glenwick 1984; Moran et al. 1996; Rhodes et al. 2003; Volpp et al. 2008), however, lead us to question this possibility because lotteries as low as £5 have been shown to be effective.

Table 3 Logistic Regression Analysis of Incentives in Kit Return

Uptake	B	SE β	z	P > z	Lower 95% CI	Upper 95% CI
Incentive (0 = no inc; 1 = incentive)	2.719	.795	3.42	0.001	1.159	4.279
Type (0 = voucher; 1 = lottery)	-1.180	.327	-3.61	0.000	-1.822	-.539
Framing (0 = loss; 1 = gain)	.117	.162	0.72	0.471	-.201	.436
Hall	-.103	.205	-0.50	0.616	-.507	.300
Gender (0 = male; 1 = female)	-.264	.151	-1.75	0.080	-.560	.031
Constant	-1.921	.437	-4.39	0.000	-2.778	-1.064

Note: LR $\chi^2(4) = 89.11$ Prob $\chi^2 = 0.0000$. Log likelihood -197.14929. Pseudo R2 0.1843

Young men were particularly motivated by the offer of an incentive: there was a significant gender difference in kit return when the £5 voucher was offered (male 17.6% vs. female 8.3%). This evidence contradicts [Zenner et al. \(2012\)](#), who found the opposite result using observational data. It remains unclear whether our results are specific to the incentive used (men may prefer HMV vouchers to other types of incentive offered in previous studies), or if they reflect a more general tendency. Our data are consistent with previous experimental studies offering incentives in the context of STI screening ([Gift et al. 2004](#)), as well as research showing that men have a greater sensitivity to reward than women ([Segal and Podoshen 2013](#); [Silverman 2003](#)). Although men tend to have higher risk-taking levels than women ([Weaver et al. 2013](#)), thus suggesting that the lottery incentive would have a greater appeal for males, we found no significant difference between the sexes.

There was a marginal difference between gain-framing versus loss-framing incentives, but in the opposite direction of initial predictions, with gain framing being slightly more effective than loss framing (10.5% vs. 7.1%, respectively). This result did not support a loss aversion hypothesis based on Prospect Theory. Our results contradict some studies on smoking cessation ([Gine et al. 2010](#); [Romanowich and Lamb 2013](#)) but, in their case, there was an actual initial endowment, and thus an actual loss. In our study, students could forego a gain but would not suffer from a real loss. Despite the fact that we presented the image of the voucher in the leaflet in an attempt to create an endowment effect, it may not have been successful in creating a psychological sense of loss. [Reb and Connolly \(2010\)](#) showed that the endowment effect was mostly explained by the physical possession of the object, more than psychological ownership per se. Further research could attempt to manipulate loss aversion more explicitly by giving incentives to subjects in advance that could only be redeemable upon performing screening.

Picking up on the [Thaler and Sunstein \(2008\)](#) assertion about the importance of *offering the right incentive to the right people in the right context*, our results, and other previous studies ([Chacko et al. 1987](#); [Zenner et al. 2012](#)) indicate that certain incentives, even if small, may provide a better compensation than prize draws. And given that STI screening mostly targets young people, the incentive offer should be compatible with the age range, for example, entertainment gift-cards and clothing vouchers. An overview of all studies that have offered financial incentives to promote Chlamydia screening ([Kissinger et al. 2000](#); [Malotte et al. 2004](#); [Low et al. 2007](#); [Currie et al. 2010, 2012](#)) shows that roughly one-half the interventions were successful, strongly suggesting that considerable attention should be given to the design of the incentive scheme.

Limitations and Future Research

The main limitation of our study is the clustered nature of the data, which increases uncertainty about the independence of observations. Nevertheless, we provided effect size calculations and controlled for the impact of hall variation in the regression analysis. A high number of clusters (in our case, student halls) could have minimized the impact of cluster randomization in the data. Future studies should address this sampling limitation and design more robust interventions with individual-level randomization.

With respect to the offered incentives, it is possible that a cash incentive could have been more effective (Mallote et al. 2004). Administrative restrictions and possible ethical criticisms to cash offers (Promberger et al. 2011) make vouchers more acceptable offers to a student population. Indeed, HMV vouchers were chosen as the incentive potentially attractive to most students, but we cannot exclude the possibility that other gift cards could be more appealing. Future studies should more thoroughly examine the moderator effect of the type of incentive. Even if the evidence to date suggests that small, certain incentives are more adequate than prize draws for promoting Chlamydia screening, it is still necessary to establish which specific type of incentive (clothing gift-cards, food vouchers, electronic gadgets, etc.) is more successful.

The overall low kit return (8.9%) even with an incentive could be explained by our procedure: inviting students to voluntarily perform Chlamydia screening, most of whom had no prior information about the disease, may be an unproductive strategy. Nevertheless, this procedure is consistent with the common outreach approach of health organizations in the UK. Every year, students living in university halls are offered free Chlamydia screening in a similar way. Our study suggests this approach should be reconsidered given the very low kit return in the control group (1.5%), which can be taken as a proxy of the success that outreach strategies have in student halls without any offer of financial incentives. But, within the existent outreach approaches, this direct contact with student in halls of residence may nevertheless be a good strategy. Low et al. (2007) sent postal invitations asking young people to perform screenings at home, but showed that the offer of a £10 voucher with this procedure was ineffective. A direct approach may facilitate engagement with the screening process.

Policy Implications

At the population level, the differences found in a pilot study may represent a considerable increase in screening coverage, but nevertheless pose questions of sustainability and cost-effectiveness. On one hand, the macro-level implications of increasing screening rates with such an intervention should be analyzed. Our results show an absolute risk reduction (ARR) of 7.4% by offering financial incentives, which corresponds to 219 young people needed to be incentivized to avert one future case of Chlamydia – assuming the 6.2% prevalence rate from Roberts et al. (2007). For the lottery intervention ($n = 502$), ARR is 1.3% and the number needed to incentivize is 1,271. For the voucher intervention ($n = 249$), the ARR is 21%, and the number needed to incentivize is 76. This suggests that a significantly lower number of young people would need to be invited if offered a voucher compared to a lottery or no incentive. Also, the cost per returned test according to Robinson et al. (2007) is estimated to be £18.55 in the voucher group, whereas under the lottery prize, the cost per returned test is £27.85. The cost per returned test using lotteries can be reduced by increasing the number of people entering the prize draw. If the same £200 lottery was offered to 2,000 young people, the cost per returned test would have been £17.12.

Future research should also address the long-term unknown effects of offering incentives to change sexual health-related behaviors. For example, is there a lasting positive learning effect that can sustain future non-incentivized health behaviors? Or should we expect an adverse impact from

the development of a negative habit that is demonstrated by lower screening rates compared to baseline rates? Although the importance of these questions is highlighted for more habitual behaviors such as smoking cessation or physical activity, it is also relevant for behaviors that are performed intermittently, for example STI screening, cancer screening, or immunization. There is thus evidence to support the conclusion that small, certain financial incentives increase the uptake of Chlamydia screening (but not prize draws).

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References

- Abellan-Perpignan, J., H. Bleichrodt, and J. Pinto-Pardes. 2008. The Predictive Validity of Prospect Theory versus Expected Utility Theory in Health Utility Measurement. *Journal of Health Economics* 28 (6): 1039–1047.
- Akl, E.A., A.D. Oxman, and J. Herrin. 2011. Framing of Health Information Messages. *Cochrane Database of Systematic Reviews* 2011: 12.
- Ariely, D., U. Gneezy, G. Loewenstein, and N. Mazar. 2009. Large Stakes and Big Mistakes. *The Review of Economic Studies* 76 (2): 451–469.
- Aruoba, S.B., and M.S. Kearney. 2011. *Do Lottery Gamblers Love Risk or Overweight Small Odds?* Working Paper, Department of Economics, University of Maryland.
- Beckwith, C.G., T.P. Flanigan, C. del Rio, E. Simmons, E.J. Wing, C.C. Carpenter, and J.G. Bartlett. 2005. It is Time to Implement Routine, Not Risk-based, HIV Testing. *Clinical Infectious Diseases* 40 (7): 1037–1040.
- Bowles, S., and S. Polania-Reyes. 2012. Economic Incentives and Social Preferences: Substitutes or Complements? *Journal of Economic Literature* 50 (2): 368–425.
- Burger, J.M., and D.F. Caldwell. 2003. The Effects of Monetary Incentives and Labelling on the Foot-in-the-door effect: Evidence for a Self-perception Process. *Basic and Applied Social Psychology* 25 (3): 235–241.
- Campbell, M.K., D.R. Elbourne, and D.G. Altman. 2004. CONSORT Statement: Extension to Cluster Randomized Trials. *British Medical Journal* 328 (7441): 702–708.
- Chacko, M.R., B.A. Cromer, S.A. Phillips, and D. Glasser. 1987. Failure of a Lottery Incentive to Increase Compliance with Return Visit for Test-of-cure Culture for Neisseria gonorrhoeae. *Sexually Transmitted Diseases* 14 (2): 75–78.
- Cook, R.L., L. Østergaard, S.L. Hillier, P.J. Murray, C.C.H. Chang, D.M. Comer, and R.B. Ness. 2007. Home Screening for Sexually Transmitted Diseases in High-risk Young Women: Randomised Controlled Trial. *Sexually Transmitted Infections* 83 (4): 286–291.
- Currie, M.J., M. Schmidt, and B.K. Davis. 2010. “Show me the money”: Financial Incentives Increase Chlamydia Screening Rates among Tertiary Students: A Pilot Study. *Sexual Health* 7 (1): 60–65.
- Duncan, B., G. Hart, A. Scoular, and A. Bigrigg. 2001. Qualitative Analysis of Psychosocial Impact of Diagnosis of Chlamydia Trachomatis: Implications for Screening. *British Medical Journal* 322: 195–199.
- Etchart-Vincent, N., and O. l’Haridon. 2011. Monetary Incentives in the Loss Domain and Behavior Toward Risk: An Experimental Comparison of Three Reward Schemes Including Real Losses. *Journal of Risk and Uncertainty* 42 (1): 61–83.
- Fehr, E., and A. Falk. 2002. Psychological Foundations of Incentives. *European Economic Review* 46 (4): 687–724.
- Frey, B., and R. Jegen. 2001. Motivation Crowding-out Theory. *Journal of Economic Surveys* 15 (5): 589–611.

- Gallagher, K.M., and J.A. Updegraff. 2012. Health Message Framing Effects on Attitudes, Intentions, and Behavior: A Meta-Analytic Review. *Annals of Behavioral Medicine* 43 (1): 101–116.
- Gift, T.L., C.K. Malotte, R. Ledsky, M. Hogben, S. Middlestadt, N.L. VanDevanter, and J.S.S. Lawrence. 2005. A Cost-Effectiveness Analysis of Interventions to Increase Repeat Testing in Patients Treated for Gonorrhea or Chlamydia at Public Sexually Transmitted Disease Clinics. *Sexually Transmitted Diseases* 32 (9): 542–549.
- Gigerenzer, G., and W. Gaissmaier. 2011. Heuristic Decision Making. *Annual Review of Psychology* 62: 451–482.
- Giné, X., D. Karlan, and J. Zinman. 2010. Put Your Money Where Your Butt Is: A Commitment Contract for Smoking Cessation. *American Economic Journal: Applied Economics* 2:13–235.
- Ginige, S., C.K. Fairley, J.S. Hocking, F.J. Bowden, and M.Y. Chen. 2007. Interventions for Increasing Chlamydia Screening in Primary Care: A Review. *BMC Public Health* 7 (1): 95–122.
- Gneezy, U., S. Meier, and P. Rey-Biel. 2011. When and Why Incentives (Don't) Work to Modify Behavior. *The Journal of Economic Perspectives* 25 (4): 191–209.
- Guy, R., H. Ali, B. Liu, S. Poznanski, J. Ward, B. Donovan, J. Kaldor, and J. Hocking. 2011. Efficacy of Interventions to Increase the Uptake of Chlamydia Screening in Primary Care: A Systematic Review. *BMC Infectious Diseases* 11: 211–224.
- Hastings, J., and J.M. Shapiro. 2012. *Mental Accounting and Consumer Choice: Evidence from Commodity Price Shocks*. Working Paper 18248, National Bureau of Economic Research.
- Health Protection Agency. 2009. *The Bigger Picture: The National Chlamydia Screening Program in England 2008/ 2009*. London: HPA.
- Heap, S.P.H. 2013. What is the Meaning of Behavioral Economics? *Cambridge Journal of Economics* 37 (5): 985–1000.
- Jenkins, W.D., R. Weis, P. Campbell, M. Barnes, P. Barnes, and C. Gaydos. 2012. Comparative Effectiveness of Two Self-Collected Sample Kit Distribution Systems for Chlamydia Screening on a University Campus. *Sexually Transmitted Infections* 88 (5): 363–367.
- Kahneman, D. 2003. Maps of Bounded Rationality: Psychology for Behavioral Economics. *The American Economic Review* 93 (5): 1449–1475.
- Kahneman, D., and A. Tversky. 1979. Prospect Theory: An Analysis of Decisions Under Risk. *Econometrica* 47: 313–327.
- Kamenica, E. 2012. Behavioral Economics and Psychology of Incentives. *Annual Review Economics* 4 (1): 427–452.
- Kiene, S.M., W.D. Barta, J.M. Zelenski, and D. Lisa Cothran. 2005. Why Are You Bringing Up Condoms Now? The Effect of Message Content on Framing Effects of Condom Use Messages. *Health Psychology* 24 (3): 321–326.
- Kissinger, P., J. Kopicko, L. Myers, S. Wustrack, W. Elkins, T. Farley, and D. Martin. 2000. The Effect of Modest Monetary Incentives on Follow-Up Rates in Sexually Transmitted Disease Studies. *International Journal of STD and AIDS* 11 (1): 27–30.
- Kleinsorge, T., and G. Rinkebaier. 2012. Effects of Monetary Incentives on Task Switching. *Experimental Psychology* 59 (4): 216–226.
- Laffont, J.J., and D. Martimort. 2009. *The theory of incentives: the principal-agent model*. Princeton University Press.
- LaMontagne, D., K. Fenton, S. Randall, S. Anderson, and P. Carter. 2004. Establishing the National Chlamydia Screening Program in England: results from the first full year of screening. *Sexually Transmitted Infections* 80 (5): 335–341.
- Loewenstein, G., D.A. Asch, and K.G. Volpp. 2013. Behavioral Economics Holds Potential to Deliver Better Results for Patients, Insurers, and Employers. *Health Affairs* 32 (7): 1244–1250.
- Low, N., A. McCarthy, and J. Macleod. 2007. *Epidemiological, social, diagnostic and economic evaluation of population screening for genital chlamydial infection*. UK: Gray Publishing.

- Low, N., W. Geisler, J. Stephenson, and E. Hook. 2013. Chlamydia Control: A Comparative Review from the USA and UK. In *The New Public Health and STD/HIV Prevention*, eds. S. Aral, K. Fenton, and J. Lipshutz, 401–429. NY: Springer.
- Madhavan, P., F.C. Lacson, C. Gonzalez, and P.C. Brennan. 2012. The Role of Incentive Framing on Training and Transfer of Learning in a Visual Threat Detection Task. *Applied Cognitive Psychology* 26 (2): 194–206.
- Malotte, C.K., R. Ledsky, and M Hogben. 2004. Comparison of Methods to Increase Repeat Testing in Persons Treated for Gonorrhea and/or Chlamydia at Public Sexually Transmitted Disease Clinics. *Sexually Transmitted Diseases* 31 (11): 637–642.
- Martin, G., and J. Pear. 2007. Behavior modification: What it is and how to do it (*Eighth Edition*). Upper Saddle River, NJ: Pearson Prentice Hall.
- Martin, S.J., M.J. Currie, L.S. Deeks, G.M. Cooper, R.M. Parker, R. Rosario Del, and F.J. Bowden. 2012. Do Cash Incentives Increase the Uptake of Chlamydia Testing in Pharmacies?. *Sexually Transmitted Infections* 88 (Suppl 1): A35–A35.
- Michie, S., and M. Johnston. 2012. Theories and Techniques of Behavior Change: Developing a Cumulative Science of Behavior Change. *Health Psychology Review* 6 (1): 1–6.
- Michie, S., and A. Prestwich. 2010. Are Interventions Theory-Based? Development of a Theory Coding Scheme. *Health Psychology* 29 (1): 1–8.
- Mills, N., G. Daker-White, A. Graham, and R. Campbell. 2006. Population Screening for Chlamydia Trachomatis Infection in the UK: A Qualitative Study of the Experiences of Those Screened. *Family Practice* 23: 550–557.
- O'Brien, L., D. Albert, J. Chein, and L. Steinberg. 2011. Adolescents Prefer More Immediate Rewards When in the Presence of their peers. *Journal of Research on Adolescence* 21 (4): 747–753.
- O'Keefe, D.J, and J.D. Jensen. 2009. The Relative Persuasiveness of Gain-Framed and Loss-Framed Messages for Encouraging Disease Detection Behaviors: A Meta-Analytic Review. *Journal of Communication* 59 (2): 296–316.
- Reb, J., and T. Connolly. 2010. Possession, Feelings of Ownership, and the Endowment Effect. *Judgment and Decision Making* 2 (2): 107–114.
- Rembold, C.M. 1998. Number Needed to Screen: Development of a Statistic for Disease Screening. *British Medical Journal* 317 (7154): 307–312.
- Rice, T. 2013. The Behavioral Economics of Health and Health Care. *Annual Review of Public Health* 34: 431–447.
- Richardson, D., K. Maple, N. Perry, E. Ambler, C. Jurd, and M. Fisher. 2010. A Pilot Qualitative Analysis of the Psychosocial Factors Which Drive Young People to Decline Chlamydia Testing in the UK: Implications for Health Promotion and Screening. *International Journal of STD and AIDS* 21: 187–190.
- Roberts, T.E., S. Robinson, P.M. Barton, S. Bryan, A. McCarthy, J. Macleod, and N. Low. 2007. Cost Effectiveness of Home Based Population Screening for Chlamydia Trachomatis in the UK: Economic Evaluation of Chlamydia Screening Studies (Class) Project. *British Medical Journal* 335 (7614): 291–298.
- Robinson, S., T. Roberts, P. Barton, S. Bryan, J. Macleod, A. McCarthy, and N. Low. 2007. Healthcare and Patient Costs of a Proactive Chlamydia Screening Program: The Chlamydia Screening Studies Project. *Sexually Transmitted Infections* 83 (4): 276–281.
- Roll, J.M., and J.T. Howard. 2008. The Relative Contribution of Economic Valence to Contingency Management Efficacy: A Pilot Study. *Journal of Applied Behavior Analysis* 41 (4): 629–633.
- Romanowich, P., and R.J. Lamb. 2013. The Effect of Framing Incentives as either Losses Or Gains With Contingency Management For Smoking Cessation. *Addictive Behaviors* 38 (4): 2084–2088.
- Rothman, A., S. Martino, B. Bedell, J. Detweiler, and P. Salovey. 1999. The Systematic Influence of Gain-And Loss-Framed Messages on Interest in and Use of Different Types of Health Behavior. *Personality and Social Psychology Bulletin* 25: 1355–1369.

- Rothman, A.J., R.D. Bartels, J. Wlaschin, and P. Salovey. 2006. The Strategic Use of Gain-and Loss-Framed Messages to Promote Healthy Behavior: How Theory Can Inform Practice. *Journal of Communication* 56 (s1): S202–S220.
- Rothman, A.J., and J.A. Updegraff. 2010. Specifying when and how gain-and loss-framed messages motivate healthy behavior: An integrated approach. In *Perspectives on Framing*, Ed. G. Keren, 257–278. London: Taylor & Francis.
- Sabini, J., M. Siepmann, and J. Stein. 2001. The Really Fundamental Attribution Error in Social Psychological Research. *Psychological Inquiry* 12 (1): 1–15.
- Schedlbauer, A., P. Davies, and T. Fahey. 2010. Interventions to improve adherence to lipid lowering medication. *Cochrane Database of Systematic Reviews* Issue 3.
- Schwartz, A., J. Goldberg, and G. Hazen. 2008. Prospect Theory, reference points and health decisions. *Judgment and Decision Making* 3 (2): 174–180.
- Segal, B., and J. Podoshen. 2013. An examination of materialism, conspicuous consumption and gender differences. *International Journal of Consumer Studies* 37: 189–198.
- Shu, S.B., and J. Peck. 2011. Psychological ownership and affective reaction: Emotional attachment process variables and the endowment effect. *Journal of Consumer Psychology* 21 (4): 439–452.
- Sigmon, S.C., and M.L. Stitzer. 2005. Use of a low-cost incentive intervention to improve counseling attendance among methadone-maintained patients. *Journal of Substance Abuse Treatment* 29 (4): 253–258.
- Silverman, I. 2003. Gender differences in delay of gratification: A meta-analysis. *Sex Roles* 49 (9-10): 451–463.
- Tebb, K.P., M.H. Paukku, M.R. Pai-Dhungat, A.A. Gyamfi, and M.A.B. Shafer. 2004. Home STI testing: The adolescent female's opinion. *Journal of Adolescent Health* 35 (6): 462–467.
- Thaler, R.H. 2003. Mental accounting matters. In *Advances in Behavioral Economics*, ed., C. Camerer, G. Loewenstein, and M. Rabin, 74–106. Princeton, NJ: Princeton University Press.
- Thaler, R.H., and C.R. Sunstein. 2008. *Nudge: Improving decisions about health, wealth, and happiness*. Yale University Press.
- Tversky, A., and D. Kahneman 1986. Rational Choice and the Framing of Decisions. *The Journal of Business* 59: S251–S278.
- . 1992. Advances in Prospect Theory: Cumulative Representation of Uncertainty. *Journal of Risk and Uncertainty* 5 (4): 297–323.
- Urban, A.B., P.A. Stout, G.D. Zimet, and D.R. Blake. 2006. The Influence of Message Framing on Adolescent Females' Intention to Obtain Chlamydia Screening. *Journal of Adolescent Health* 38(2): 126–127.
- Volpp, K.G., G. Loewenstein, and A.B. Troxel. 2008. A Test of Financial Incentives to Improve Warfarin Adherence. *BMC Health Services Research* 8 (1): 272
- Von Neumann, J., and O. Morgenstern. 1944. *Theory of Games and Economic Behavior*. NJ: Princeton University Press.
- Weaver, J., J. Vandello, and J. Bosson. 2013. Intrepid, Imprudent, or Impetuous? The Effects of Gender Treats on Men's Financial Decisions. *Psychology of Men and Masculinity*, 14(2): 184–191.
- Winter, L., and B. Parker. 2007. Current Health and Preferences for Life-Prolonging Treatments: An Application of Prospect Theory to the End-Of-Life Decision Making. *Social Science and Medicine* 65: 1695–1707.
- Worthy, D., M. Gorlick, J. Pacheco, D. Schyer, and W. Maddox. 2011. With Age Comes Wisdom: Decision Making in Younger Adults and Older Adults. *Psychological Science* 22 (11): 1375–1380.
- Zenner, D., D. Molinar, T. Nichols, J. Riha, M. Macintosh, and A. Nardone. 2012. Should young people be paid for getting tested? A National Comparative Study to Evaluate Patient Financial Incentives for Chlamydia Screening. *BMC Public Health* 12 (1): 261.