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Vouchers versus Lotteries: What works best in promoting Chlamydia screening? A cluster randomised controlled trial

Claudia Niza, **Caroline Rudisill**, and **Paul Dolan**
Department of Social Policy London School of Economics and Political Science

Abstract

In this cluster randomised 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%) that loss-framed incentives (7.1%).

This work fundamentally contributes to the literature by testing the predictive validity of Prospect Theory to change health behaviour in the field.

Introduction

Policymaking traditionally works 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 maximise their utility (Laffont & 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 & Falk, 2002; Kamenica, 2012). Economic theory derives its strength from predicting how people make cost-benefit calculations and change their behaviour in response to changes in incentives (Gneezy et al, 2011).

Although this framework has been proven 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 & Polania-Reyes, 2012; Gigerenzer & Gaissmeier, 2011; Kamenica, 2012). This means that the offer of financial incentives – standard tools from neoclassical economics – may not always work as expected (Ariely et al, 2009).

Behavioural economics integrates psychological insights into neoclassical economics in an attempt to address some of its descriptive limitations of standard theory (Dellavigna, 2009; Heap, 2013; Loewenstein et al, 2013). As such, behavioural economics assumes that financial incentives may be effective in changing behaviour, but considers the importance of

Correspondence may be sent to: c.niza@lse.ac.uk.
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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 behavioural perspective to the analysis of economic forces does not undermine them or imply they are unimportant. The highly influential work of Thaler and Sustein (2008) “NUDGES” makes this point very clearly. The first letter N on NUDGES stands for iNcentives (Thaler & Sustein, 2008). According to Thaler and Sustein (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) will provide 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 can cause severe reproductive, skin and visual problems.

The National Chlamydia Screening Programme 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 to individuals. 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 the screening uptake by increasing awareness to 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 behaviour in the desirable direction, by tackling key motivational or contextual barriers (Schedlbauer et al, 2010; Michie & Johnson, 2012) including financial incentives (Michie & Prestwich, 2010).

Literature Review

Financial incentives have been increasingly 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 economics (Laffont & Mortimer, 2009) predict that incentives will increase the likelihood of behaviour *ceteris paribus*. Behaviourist principles of operant conditioning in psychology support the position that behaviour 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 behaviour would be positively reinforced. Neoclassical economics provides a similar basis

to generate predictions about behavioural 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 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 behaviour (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 a 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 behaviour 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 between a £50 voucher to a £2000 holiday trip for four. The remaining schemes used smaller incentives 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 madefrom 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 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 US (Malotte et al, 2004). In this study, participants were offered either $20 cash or a $20 grocery voucher but only cash was effective in promoting screening. These experimental studies raise questions about the generalizability of 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 behaviour change. 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 & 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 (Arouba and Kearney, 2011). People tend to be risk-seeking for gains of low probability (Tversky & Kahneman, 1992), suggesting that lotteries may be potent incentives, particularly when associated with a high payoff. Although the comparison of a £5 voucher with a £200 lottery 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 will 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 favouring 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 & 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 behaviour are referred to as gain-framed (Rothman & 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 in promoting behavioural change (Rice, 2013). The evidence is mixed, however, and there is no clear support for the superiority of loss-framing.

Studies on this topic tend to divide the analysis by illness prevention versus detection: examples of preventive behaviour are smoking cessation, safe sex or sunscreen use, whereas detection is related to STI screening or cancer screening. There is some consensus that gain-framed messages are more likely to encourage prevention behaviours (Kiene et al, 2005; O'Keefe & Jesen, 2008, 2009; Gallagher & 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 & Updegraff, 2012).

Regarding Chlamydia screening, Urban et al. (2006) evaluated the impact of gain versus loss-framed messages in 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 & 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 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 a long-term behavioural change, contrary to the one-shot screening moment as Chlamydia screening. The present study makes an innovative application of Prospect Theory to sexual health behaviour 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 behaviour. 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 and 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 incentive groups. This hypothesis is derived from neoclassical economics and operant conditioning (Gneezy et al. 2011; Kleinsorge and Rinkenauer, 2012) which propose that, all other things being equal, an incentive will increase the likelihood of the desired behaviour.

Hypothesis 2. A £5 voucher will increase the uptake of Chlamydia screening more than a £200 lottery. The certainty effect (Tversky & Kahneman, 1986) and previous observational studies using incentives in sexual health (Chacko et al. 1987; Zenner et al. 2012) suggest 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 to increase the uptake of Chlamydia screening. This hypothesis is derived from Prospect Theory and the concept of loss aversion (Tversky and Kahneman, 1979, 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=1060), and can be considered the core target population of the National Chlamydia Screening Programme 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. The design effect 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 benchmark. We will establish ICC at .01 because participants, although living in different halls, are all undergraduate students under 25 living in London with no significant age difference between halls (95% of students 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 randomisation, which has, at a .05 significance level, 80% power to detect around a 10% uptake difference between groups.

Regarding the gain versus loss framing of the offered incentive, there was a simple randomisation 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

[1]Design effect=1+(average number of individuals per cluster-1)×ICC)

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).

Although this study has four experimental conditions (2 framing × 2 type of incentive) and control groups, only the type of incentive (voucher or lottery) required cluster randomisation between-halls. Therefore, the four halls were randomly selected to test the offer of the voucher, the lottery or no incentive. As 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 Programme 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 organisations 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 include 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 the reception on the same or next day. This direct delivery method and home testing has been proven 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 programme is the final completion rates of the tests. Thus, we will only be reporting on the return of the screening kits.

Incentives

Individuals set budgets for spending and allocate expenses in various categories, for example, for food, accommodation, 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, which usually live with a limited budget.

The incentives offered were HMV gift cards - HMV stands for His Master's Voice and is 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 to win the lottery (e.g., among how many students would the lottery be drawn) which may carry limitations in its comparison with the voucher as 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 to win the prize. Moreover, even if the lottery does not have the same expected value as a certain voucher, the available budget of health organisations 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 offer of incentive was framed as following 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 & 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 (χ^2=20.040 df = 1 p<.001). Only 1.5% of the students from control group returned the kits that they had picked up, compared to 8.9% of 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 the voucher to be more effective than the lottery. There was a significant difference in the proportion of Chlamydia kits returned according to the type of incentive (χ^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%; χ^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 (χ^2=.128, df = 1, p=.425); Lottery (χ^2=1.192 df=1 p=.206).

Gender distribution and kit return

Halls had different gender proportions (χ^2=84.811, df = 3, p<.001), with a higher female proportion in the halls in which incentives were offered. This was controlled for in the regression analysis. Gender makes no statistically significant difference in whether a kit was returned in the control group (male 1.1% vs. female 2% χ^2=0.463, p=0.661), but proportionally more men than women returned screening kits when an incentive was offered (male 17.6% vs. female 8.3% χ^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). This 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 incentive offered was an 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 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) which reached a similar conclusion using observational data. We propose that, in the case of an activity which 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 behaviour (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 showed to be effective.

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 is remains unclear if our results are specific to the incentive used (men may prefer HMV vouchers to other type of incentive offered in previous studies) or 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 greater sensitivity to reward than women (Segal and Podoshen, 2005; Silverman, 2003). Although men tend to have higher risk-taking levels than women (Weaver et al, 2012), 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 & 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 but that could only redeemable upon performing screening.

Picking up on Thaler and Sustein (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 design of the incentive scheme.

Limitations and future research

The main limitation of our study is the clustered nature of the data, which increases the 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 minimised the impact of cluster randomisation in the data. Future studies should address this sampling limitation and design more robust interventions with individual-level randomisation.

With respect to the incentives offered, 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 an incentive potentially attractive to most students, but we cannot exclude the possibility that other gift cards could be more appealing. Future studies should examine more thoroughly 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 to promote 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 from health organisations 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 screening at home but showed that the offer 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 analysed. Our results show an absolute risk reduction (ARR) of 7.4% by offering financial incentives, which corresponds to 219 young people needed to be incentivised 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 incentivise is 1,271. For the voucher intervention (n = 249), the ARR is 21% and the number needed to incentivise 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. And 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 was £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 2000 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 behaviours. For example, is there a lasting positive learning effect that can sustain future non-incentivised health behaviours? Or should we expect an adverse impact from the development of a negative habit that is demonstrated by lower screening rates compared to baseline? Although the importance of these questions is highlighted for more habitual behaviours as smoking cessation or physical activity, it is also relevant for behaviours which are performed intermittently, for example, STI screening, cancer screening, or immunisation. There is thus evidence to support that small, certain financial incentives increase the uptake of Chlamydia screening (but not prize draws).

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Table 1

Incentive conditions

		Incentive Frame	
		Gain	**Loss**
Incentive Probability	**Certain**	Receive £5 HMV voucher if returns the test	Loses £5 HMV voucher if doesn't 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 doesn't return the test

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Table 2

Returned Chlamydia kits per incentive vs framing

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

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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

LR chi2(4) =89.11 Prob > chi2 =0.0000

Log likelihood = −197.14929

Pseudo R2 =0.1843