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Incentivizing HIV/STI Testing: A Systematic Review of the Literature

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Abstract

Suboptimal HIV/STI testing uptake has a profound impact on morbidity and mortality. Incentives have been effective in other areas of medicine and may improve HIV/STI testing uptake rates. This study reviewed the effects of incentives on HIV/STI testing uptake. A systematic search of seven databases was undertaken. Testing uptake was defined as test implementation and/or test result retrieval. Incentives were defined as monetary or non-monetary rewards or free-of-charge testing vouchers. Seven studies were included. All seven studies demonstrated higher rates of uptake in an incentivized group. Incentives offered at a nonclinical setting demonstrated more significant differences in uptake rates compared to incentives offered at a clinical setting. Incentivizing HIV/STI testing uptake, especially testing at a non-clinical setting, may be a useful tool to modify health behavior. Further research is needed to understand how incentives could be an effective component within a comprehensive HIV/STI control strategy.

Keywords

HIV/AIDS; Sexually transmitted diseases; Incentive; Conditional cash transfer; Voucher; Contingency management

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Introduction

Testing for sexually transmitted infections (STIs), including HIV, is critical for effective epidemic control. However, despite the fact that STIs are treatable diseases, many high-risk individuals continue to have suboptimal test uptake [1]. Among all HIV-infected individuals, at least 20 % in the US and the majority worldwide do not know their serostatus [2]. Failure to receive testing may have a profound impact on health through delayed diagnosis and treatment [3, 4]. Failure to receive testing may also lead to the spread of infection to others [5, 6]. Conventional strategies such as education and awareness campaigns have only been partially successful in promoting STI testing worldwide. Economic incentives may help to decrease testing barriers and increase STI test uptake.

The use of incentives to increase STI test uptake is grounded in two economic concepts related to decision-making. First, an economic incentive, whether it is monetary or non-monetary, may reduce the cost of testing and contribute to a price effect on the demand for testing. Second, it is possible that some individuals display present-biased preferences of a behavior, whereby they place a disproportionate emphasis on the immediate costs and benefits such as economic burden or fear of a positive result compared to future costs and benefits [7]. A testing incentive could therefore increase the present benefits of testing and increase the likelihood of test uptake.

Incentives have been used to temporarily change health behaviors in other areas of medicine and health. Previously utilized incentives included monetary rewards (sometimes referred to as conditional cash transfers, or CCTs), non-monetary rewards that are offered conditionally on behavior, as well as partially or fully subsidized vouchers to promote uptake of specific health services or technologies. CCTs in particular have gained prominence on the basis of several successes in various settings [8]. Studies have shown that CCTs promoted safer sexual practices [9], reduced HIV and HSV-2 infections in adolescent girls [10], increased tuberculosis skin test reading compliance [11, 12], promoted changes in health-related behavior in the area of addictions [13–15], improved smoking cessation [16], and improved uptake of health interventions [17]. CCTs have also been effective in improving education outcomes in Latin America [18]. Finally, the provision of free-of-charge testing vouchers has been effective in promoting maternal health services [19] and malaria prevention [20]. With demonstrated success in other areas of health, including HIV, incentives may prove valuable for increasing STI testing. This systematic review aims to investigate the impact of incentives on HIV/STI testing uptake.

Methods

Search Strategy

The electronic databases of PubMed, Social Science Research Network, the Cochrane Library, JSTOR, Social Edge, EconLit, and PyscInfo were searched according to PRISMA guidelines. Articles that fulfilled inclusion criteria and were indexed on or before June 2nd, 2013 were included. There were no language or date restrictions placed on database searches. All reference lists of selected articles were also searched to identify potentially

relevant articles. Conference abstracts of the International AIDS Society webpage were searched to identify further original research studies. The terms “HIV” or “STI” or “sexually transmitted infection” or “STD” or “sexually transmitted disease” and “incentive” or “voucher” or “conditional cash transfer” or “CCT” or “contingency management” were used when searching through databases. The PubMed search algorithm is listed as supplementary material.

Criteria for Selecting Studies for this Review

Inclusion criteria consisted of interventional use of incentives to increase uptake of STI testing (including HIV). We defined uptake as both test implementation and/or retrieval of test results. Incentives were defined as monetary or non-monetary rewards or free-of-charge testing vouchers provided to individuals to increase uptake of STI testing. CCTs were defined as monetary rewards. Duplicate articles were removed and the titles and abstracts of the remaining articles were independently screened by two researchers (RL and RC). Articles were excluded if uptake of STI testing or percentage of first-time testers was not an outcome measure, if testing was not for STI, if an incentive was not a significant aspect of the intervention, or if original data was not reported. Discordant articles were resolved by a third researcher (JT) through abstract review.

Data Extraction

For the studies that met inclusion criteria, data extracted from the articles included study location, study design, study population, sample size, study quality, incentive value and conditions, setting of testing location, STI tested, testing uptake outcomes (intervention and control), statistical comparisons for testing uptake outcomes, and other non-testing uptake outcomes measured. Setting of testing location was defined as a traditional clinical environment (e.g. STI clinic, drug treatment facility) or a non-clinical environment (e.g. homeless shelter, social event, entertainment venue, mobile van). Testing uptake outcomes included screening test rates, test of cure rates, repeat test rates, test result retrieval rates, and percentage of first-time testers.

Study Quality Assessment

The quality of studies was assessed using a validated quality assessment tool [21]. The following eight items were assessed to calculate a total quality score: (1) clear definition of the target population; (2) representativeness of probability sampling; (3) sample characteristics matching the overall population; (4) adequate response rate; (5) standardized data collection methods; (6) reliability of survey measures/instruments; (7) validity of survey measures/instruments; (8) appropriate statistical methods. Answers were scored 0 for “no” and 1 for “yes” for a total possible score between 0 and 8.

Results

Process of Study Selection

As shown in Fig. 1 773 studies were retrieved from database searches and 34 studies fulfilled basic criteria of using an incentive consisting of CCT, non-monetary reward, or testing voucher to increase STI testing uptake. Among the studies excluded based on full

text review, eleven did not measure STI testing uptake, five did not have incentivizes as a significant aspect of the study design, three did not have comparable comparison and intervention groups, three were qualitative studies, three were reviews, and two utilized a similar sample in another study. Seven studies were ultimately included for review, representing 17,902 participants from four countries. All seven studies used monetary or non-monetary rewards and no studies used testing vouchers. Study description and designs are outlined in Table 1.

Study Characteristics

Two studies [22, 23] were published before 2000 and five studies [24–28] were published after 2000. Four studies [22–25] had fewer than 1,000 individuals and three [26–28] studies had 2,500–9,500 individuals. Four studies were conducted in high income nations, two studies in upper-middle income countries, and one in a low income country [29]. Three studies [25, 26, 28] examined testing for HIV, two studies [22, 24] examined gonorrhea, two studies [24, 27] examined chlamydia, and one study [23] examined syphilis.

Study Design

Among the seven included studies, two [24, 26] were randomized controlled trials and five [22, 23, 25, 27, 28] had some form of comparison group. Six studies [22–27] analyzed STI testing uptake rates and one study [28] examined the percentage of first-time testers among a population of testers. Three studies [22, 24, 25] offered incentives in clinical settings and four studies [23, 26–28] offered incentives in non-clinical settings. Six studies [22– 25, 27, 28] incentivized implementation of a test while one study [26] incentivized retrieval of results from a population that had already undergone test implementation. Five studies [23, 25–28] measured STI testing rates used for screening purposes and two [22, 24] for post-infection testing purposes. Six studies [22–27] offered a form of monetary rewards and one study [28] offered a non-monetary reward in the form a subsidized food voucher.

Outcome Analysis

Study outcomes are outlined in Table 2. All seven studies found higher rates of STI testing uptake in an incentivized group (intervention group, IG) as compared to a non-incentivized group (control/comparison group, CG). Five of the seven studies [23, 25–28] found a large difference in STI testing uptake outcomes between the intervention and control/comparison groups (>15 % point difference) while the remaining two studies [22, 24] found only a two percentage point difference between groups.

The three studies that offered testing at a clinical setting [22, 24, 25] all demonstrated a more modest difference in testing uptake between the incentivized and non-incentivized groups (≤15 % point between-group difference). In contrast, all three studies that offered testing at a non-clinical setting [26–28] found larger differences between the incentivized and non-incentivized groups. The one study that offered test result retrieval at both clinical and non-clinical settings [23] found a non-significant overall difference in result retrieval (CG: 68 % vs. IG: 74 %), but a significant difference in test retrieval at non-clinical settings (CG: 47 % vs. IG: 69 %). Of note, test result retrieval in clinical settings in this study was

extremely high in both the non-incentivized and incentivized group (CG: 91 % vs. IG: 94 %).

Non-testing outcome measures varied greatly amongst the included studies. Nglazi et al. and Haukoos et al. measured HIV prevalence of study participants. Malotte et al. measured reinfection rates and Nglazi et al. measured the clinical status of HIV-positive participants which may provide important information to stratify specific types of individuals who are more likely to utilize STI testing. Thornton et al. measured the effect of distance to test retrieval site, an additional factor that may influence uptake rates.

The value of incentives offered to participants also varied between the studies. Five studies [23–27] offered monetary rewards that ranged from $5 to $25. Of the studies offering monetary rewards, four studies were conducted in the United States or Australia and one was conducted in rural Malawi where the incentive was valued at approximately a day's wage. One study [22] offered an entrance into a lottery with a maximum prize of $50. One study [28] that was conducted in urban areas outside Cape Town, South Africa offered a non-monetary reward of a food voucher with a value of $10.30. Lastly, one study [26] tested the effect of offering different incentive values and found that a small incentive was as effective as a larger incentive. It should be noted that the "value" of incentives may not be directly comparable across studies that have been conducted in different years or even across different geographic locations within the same year.

Discussion

Increasing STI testing uptake is a priority in a wide range of countries and populations. To our knowledge this is the first systematic review to look at the effect of offering economic incentives to increase STI testing uptake. Our review expands on previous reviews that examined the use of cash payments on HIV prevention [30, 31], other areas of medical adherence [32] and lifestyle changes [8, 17, 33– 35]. By encompassing all STIs and focusing on quantitative studies that measure uptake rates, we are able to gain a broad and concrete perspective on incentive-based testing promotion. Also, our review includes not only the effect of monetary incentives on STI testing uptake, but the effects of non-monetary incentives and testing vouchers as well. A focused review of testing uptake rates and percentages of first-time testers provides a more tangible effect of incentives and a more concrete measure of effect. All included studies demonstrated higher rates of testing uptake when participants were incentivized compared to participants who were not incentivized. As shown in other sectors of healthcare where incentives have promoted health behavior modification, this study highlights STI testing as another health behavior that may be influenced by the provision of incentives.

Incentives increased testing uptake to a greater extent when testing was offered at a non-clinical setting compared to testing offered at a clinical setting. Of the three studies [26–28] that only performed testing at non-clinical settings, differences between incentivized and non-incentivized uptake were 43, 19.5, and 18.1 %. Three studies [22, 24, 25] that only performed testing in clinical settings demonstrated differences in uptake rates of 15, 2, and 1.8 %. These findings could be explained by the difference between clinic and non-clinic

based populations, with the former having greater health-seeking tendencies and therefore being less likely to require an incentive in order to be encouraged to get tested. In contrast, participants recruited in non-clinical settings may have less interest in testing and a small incentive might be more effective for encouraging testing. Also, participants recruited in clinical settings may be more comfortable and trusting of STI testing provided at that type of environment. Non-clinical locations utilized in the studies included sites such as a homeless shelter and soup kitchen, which may present as an unfamiliar, unstandardized, and non-sterile environment for participants. The use of an incentive, thus, may prove to be an effective way to overcome these barriers for non-clinic based testing.

Our review found that incentivizing testing for screening purposes was more effective than incentivizing post-infection testing. There are a number of reasons to test an individual for STI, including pre-infection screening testing, post-infection repeat testing, and post-infection testing of cure [36]. Chacko et al. and Malotte et al. examined incentivized post-infection STI testing and demonstrated non-significant intervention effects. Participants in these studies had undergone treatment for a previous positive STI test result. An assumption that previous treatment for STI would unequivocally cure the infection may create a strong deterrent for further testing despite the presence of an incentive. This may lend support to the need for greater education on the risks of re-infection and antibiotic resistance. A smaller increase in post-infection testing uptake may also be attributed to differences in CDC guidelines for STI testing compared to the testing guidelines developed in a research study. If a study is incentivizing participants to undergo testing (e.g. test of cure) that is not recommended by CDC guidelines, participants may be deterred from testing. These findings reveal that incentives may be most effective to expand screening where there is greater need, such as among most-at-risk populations.

Presumably a larger incentive would promote more testing, however, among the studies that provided monetary incentives, larger or smaller incentives relative to daily wages were not associated with higher testing uptake. Thornton et al. directly compared the effect of different incentive values in the same study. This study based in Malawi found that the largest non-zero incentive did not increase uptake significantly more than the smallest nonzero incentive. This suggests that an incentive for STI testing may be effective not by virtue of its price effect (whereby it reduces the cost of getting tested) but rather by virtue of its ability to address individuals' present-biased preferences [37]. However, given that only one study directly compared the effect of varying incentive values, further research is warranted to determine the optimal size of incentives if these interventions are to be implemented on a large scale. Another design consideration regarding incentive-based interventions is whether monetary incentives are more effective in encouraging testing than non-monetary incentives. This comparison was not made by any of the studies that we reviewed but warrants further research.

Despite a thorough search for the use of both incentives and vouchers to incentivize STI testing uptake, no studies examining vouchers met inclusion criteria. Vouchers, however, have been used to promote attendance at sexual risk behavior reduction sessions [38, 39] and general sexual and reproductive health services [40]. No studies were found that measured STI testing uptake rate outcomes. Two studies [41, 42] offered vouchers for STI testing,

however the non-incentivized and incentivized groups were not comparable. Our systematic review thus identifies a gap of knowledge of the effectiveness of free-of-charge testing vouchers on testing uptake. Vouchers differ in the mechanism of motivation compared to monetary and non-monetary incentives because no additional action is needed to obtain the benefits of the testing voucher. The participant must simply make a personal decision to use the voucher or not use the voucher. Incentives, on the other hand, require a participant to fulfill an obligation before receiving the incentive. Another difference, and possible advantage, is that testing vouchers have a more targeted usage by strictly promoting testing compared to offering monetary rewards which may encourage participation for the monetary gain rather than for the health benefits of testing. On the other hand, the strict usage of vouchers may decrease the number of individuals who are willing to be tested. These differences between rewards and vouchers may prove of interest for future research.

There are limitations to this systematic review. First, studies varied in the extent to which they were able to ensure comparability between the comparison and intervention conditions. However, we excluded two studies on this basis and the included studies were relatively comparable. Second, changes in the availability of ART worldwide may have also decreased barriers to testing over time and may introduce uncertainty over time. Additionally, economic data on the financial background of the participants were not provided for any of the included studies. The cost effectiveness of implementing incentives was also not studied except for one study [27].

With suboptimal testing prevalent within different populations [1], incentives can be useful in STI control. Incentives were particularly useful for expanding STI testing at non-clinical settings and were shown to be effective at expanding screening. This may be especially valuable in reaching most-at-risk populations with limited access to healthcare [43] and who may be missed through health facility-based services [44]. Implementation of incentivized non-clinical testing uptake can provide new avenues to increasing testing and capture populations previously missed by more traditional testing strategies. Recently, community-based organizations have been shown to be an effective alternative to clinical testing sites [1] and advances in point-of-care testing provide another avenue to pursue non-clinical based uptake [45]. Decentralized testing, ranging from community-based testing to self-testing, is now feasible for HIV, syphilis, and Hepatitis C [45]. Although incentives may work through their effect on price and present-biased preferences, further research on the theoretical underpinning of incentives is also necessary. Understanding optimal conditions and specific types of individuals who would respond to incentives is crucial to evaluating the notion that incentives can increase testing among high-risk individuals who are not reached through current testing efforts. Incentives for testing are not a panacea, but may hold promise as one component of a comprehensive HIV/STI control strategy.

Supplementary Material

Refer to Web version on PubMed Central for supplementary material.

Acknowledgments

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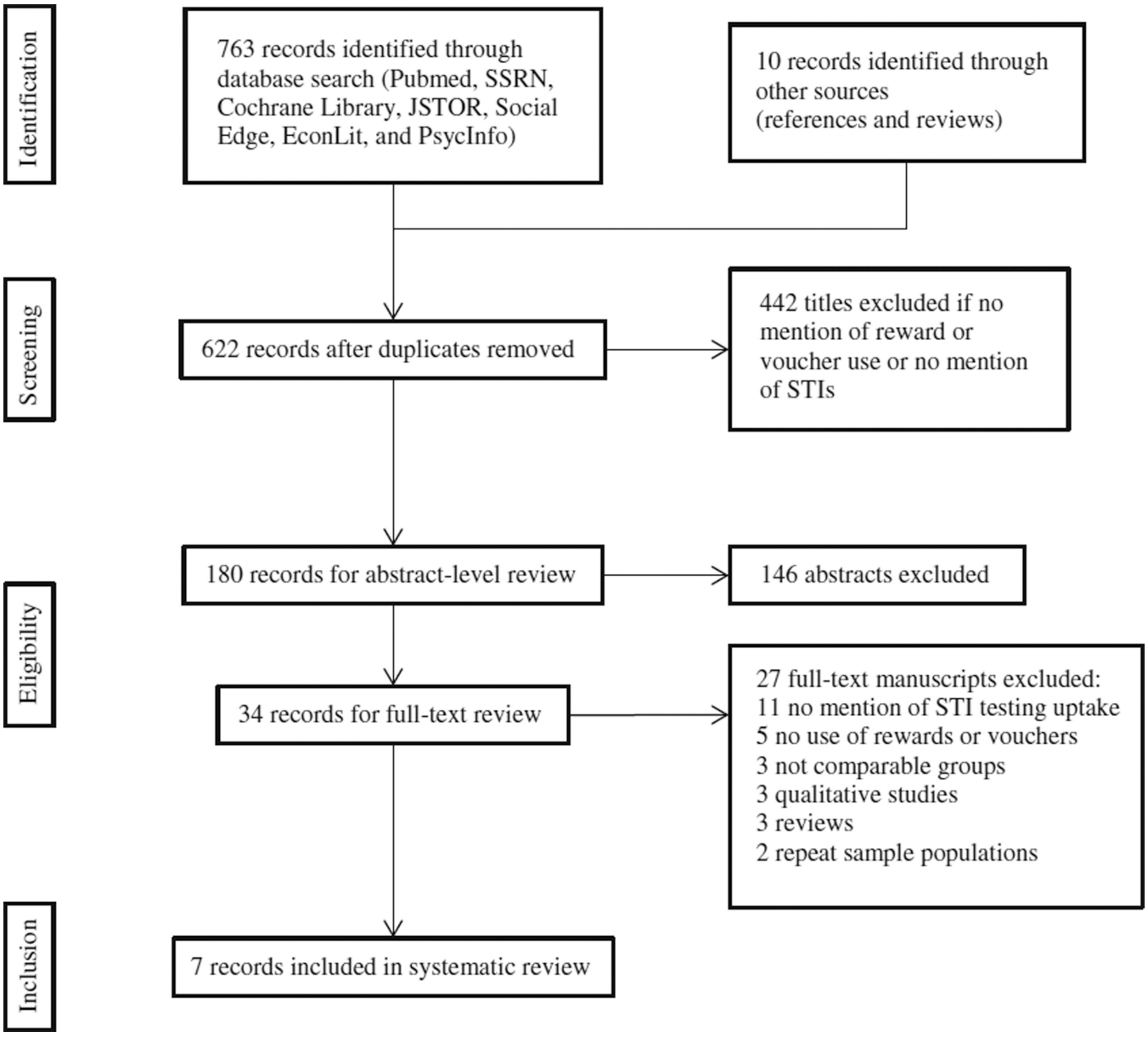

Fig. 1.
Flow chart of research study selection (original search completed June 2nd, 2013

Table 1

Study characteristics

First author	Location (city, country)	Study design	Study population	Sample size	Quality assessment	Control/ comparison group	Intervention group	Setting of location of test uptake (clinical or nonclinical)	STI tested	Function of uptake
Chacko [22]	Baltimore, USA	Quasi-experimental intervention[a]	Teenagers treated at a STI clinic	519	7	Request for a test of cure	CG + incentive of entrance into $50 lottery	Clinical	Gonorrhea	Post-infection test of cure
Currie [27][b]	Australia Capital Territory, Australia	Quasi-experimental intervention	Sexually active university students	3652	8	Screening offered at campus activities	$10 incentive for on-campus screening and result retrieval via text message	Non-clinical, on-campus screening	Chlamydia	Screening test
Geringer [23]	Philadelphia, USA	Quasi-experimental intervention	General population	708	7	Testing and result retrieval at homeless shelters and STI centers	CG + $5 incentive for test result retrieval	Clinical and nonclinical Non-clinical, homeless shelters/ soup kitchens	Syphilis	Screening test
Haukoos [25]	Los Angeles, USA	Quasi-experimental intervention	ED patients with a high risk of HIV	372	7	Referral for VCT 1 week after ED visit	CG + $25 incentive for fulfillment of VCT referral	Clinical	HIV	Screening test
Malotte [24]	Prince George's County and Los Angeles, USA	Randomized controlled trial	Patients treated at a STI clinic	423	8	Request for 3 month retesting	CG + $25 incentive for retesting	Clinical	Gonorrhea, chlamydia	Post-infection repeat test
Nglazi [28]	Cape Town, South Africa	Quasi-experimental intervention	Men in community	8708	7	Use of a mobile VCT service	CG + appointment and $10.30 food voucher	Non-clinical, mobile VCT service	HIV	Screening test
Thornton [26]	Malawi	Randomized controlled trial	Individuals previously tested for STI	2812	7	Request for result retrieval at temporary centers	CG + $1.01 incentive for result retrieval[c]	Non-clinical, temporary VCT centers within neighbors	HIV	Screening test

CG Control group, *VCT* voluntary counseling and testing

[a] Quasi-experimental study designs intend to estimate the causal impact of an intervention, but without random assignment

[b] Study contained a third non-comparable study group

[c] Inventive levels were varied at random between 0 and 3 USD

Table 2

Study Outcomes

First author	Outcome measure	Intervention group outcome: incentivized testing uptake	Control/ comparison group outcome: non-incentivized testing uptake	Statistical analyses (incentivized vs. non-incentivized)	Non-testing outcome measure
Chacko [22]	Test of cure rate	33 %	31 %	NS	Within the lottery group: participation versus no participation in the lottery as a predictor for test of cure
Currie [27]	Screening rate	42.4 %	22.9 %	95 % CI 39.1–45.7 versus 21.3–24.4	Cost of study
Geringer [23]	Test result retrieval rate	74 %	68 %	Z = 3.10, *p* value: < 0.01 for homeless shelter/soup kitchen Z = NS for drug treatment centers	Incentivizing treatment of positive test result
Haukoos [25]	Screening rate	23 %	8%	OR 3.4 (95 % CI 1.8–6.6)	HIV prevalence
Malotte [24]	Repeat testing rate	13.2 %	11.4 %	OR 1.19 (95 % CI 0.6–2.4)	Cognitive mediating variables of retesting, reinfection rate at follow up
Nglazi [28]	Percentage of first-time testers[a]	60.1 %	42.0 %	*p*< 0.001	HIV prevalence, immunological and clinical status in the HIV-positive participants
Thornton [26]	Test result retrieval rate	77 %	34 %	B1 0.153, SE 0.081	Effect of distance on learning test results, sexual activity, condom use

B1 beta1, *CI* confidence interval, *NS* not significant, *OR* odds ratio, *SE* standard error

[a]Study measured the percentage of first-time testers and repeat testers for incentivized and non-incentivized uptake