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Article in Children and Youth Services Review · October 2014
DOI: 10.1016/j.childyouth.2014.03.025

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Improving HIV testing amongst adolescents through an integrated Youth Centre rewards program: Insights from South Africa

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A R T I C L E   I N F O

Available online 4 April 2014

Keywords:
HIV
Voluntary counseling and testing
Adolescents
South Africa
Youth Centre
Incentives

A B S T R A C T

Despite high HIV prevalence the uptake of HIV counseling and testing (HCT) has been low in South African adolescents, in particular among boys. We designed and implemented an integrated Youth Centre (YC), which included a health clinic and a points based rewards program to incentivize YC services, adjacent to a peri-urban community in Cape Town. We compared 12 month age and gender specific HCT rates for 12–22 year olds between the YC and the single local community clinic in the adjacent community prospectively and for the 12 months prior to YC implementation. Local clinic data were collected through the HCT register. At the YC demographic, attendance, incentives and HIV testing data were prospectively collected via a biometric data collection system. 1187 12–22 year olds attended the YC in the 12 month period. Within the 12–15 year old age group, 12.7% more individuals tested at the YC compared to the clinic in 2011–2012; this difference was greater in males than females. In the 16–22 year category, significantly more individuals tested at the clinic compared to the YC. The use of the YC reward program was associated with undergoing an HIV test. Understanding the specific programmatic factors that led to increased testing behaviour including the role of incentives at the YC warrants further attention.

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1. Introduction

Almost half of all new HIV infections occur in young people (UNAIDS, 2012). South Africa has one of the highest HIV prevalence rates in the world, with an estimated 17% of the population between 15 and 49 years, infected (ibid). In the 15–24 year old age group, where modelling has predicted 36% of all heterosexual transmission occur (Johnson, Dorrington, Bradshaw, Wyk, & Rehle, 2009), HIV prevalence is 15% and higher among females than males (Shisana & Rehle, 2009).

HIV counselling and testing (HCT) is the gateway to HIV care and prevention with a recent systematic review demonstrating the role of HCT in the reduction of HIV-related sexual risk behaviours in low and middle-income countries (Fonner, Denison, Kennedy, O’Reilly, & Sweat, 2012). In 2007, the World Health Organisation (WHO) recommended routine HIV testing among youth in epidemic settings (WHO, 2007). In these environments the risk of sexual transmission is high; however, testing also provides the opportunity to uncover undiagnosed perinatally transmitted HIV, with a recent study in Zimbabwe finding that maternal transmission was likely in 80% of 10–18 year olds testing HIV-positive at a primary care clinic (Ferrand et al., 2010).

Despite this call, testing rates in young people remain low. In South Africa 47% of adults report having had an HIV test (Shisana & Rehle, 2009) compared to only 25% of females and 15% of males aged between 15 and 24 years (Pettifor et al., 2005). A recent cross-sectional study of an out-patient clinic in Durban found low testing numbers (41%) with only 30% of 12–17 year old males testing for HIV (Ramirez-Avila et al., 2012). Possible reasons for these limited numbers include fear of stigma from teachers and care-givers and a lack of confidentiality at the testing site (MacPhail, Pettifor, Moyo, & Rees, 2009; Young et al., 2010). Many youth also believe that they are not at risk as they are asymptomatic or not yet sexually active (Ferrand et al., 2011; MacPhail, Pettifor, Coates, & Rees, 2008).

To overcome some of these known barriers, the WHO published a framework for youth friendly health services (YFHS). This includes that health services are accessible, equitable, acceptable, appropriate, comprehensive, effective and efficient for young people (WHO, 2002). However internationally there is little evidence that this framework

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http://dx.doi.org/10.1016/j.childyouth.2014.03.025
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has been successfully implemented (Tylee, Haller, Graham, Churchill, & Sanci, 2007) and in South Africa no adolescent HIV prevention interventions have led to a documented reduction in HIV incidence (Harrison, Newell, Imrie, & Hoddinott, 2010). Various strategies have recently been tested to incentivize uptake of health services by adolescent such as invitations from peers and use of mobile phone text messages (Mohlala, Boily, & Gregson, 2011; Perry et al., 2012). Another approach that is receiving increased attention is incentive based interventions to reduce HIV risk. Conditional cash transfers have had successful results in immunization and education behaviours amongst children in low and middle-income countries (Higgins, Silverman, Signon, & Naito, 2012). There is much ongoing research into incentives based strategies to prevent HIV across sub-Saharan Africa, with recent studies from Malawi and South Africa demonstrating increased HIV testing uptake through provision of financial incentives (Nglazi et al., 2012; Thornton, 2008). However at this time, the evidence for improvements in health outcomes is mixed with more robust and comprehensive evidence required (Ranganathan & Lagarde, 2011; Witter, Fretheim, Kessy, & Lindahl, 2012).

Against this background, the Desmond Tutu HIV Foundation (DTHF) built; designed and implemented a community based Youth Centre (YC) that provided a YFHS in conjunction with recreation, education and leadership programs. The integrated YC program also includes an incentive framework to reward healthy choices. Here we report on the HIV testing rates in the first year of the YC operation in comparison to the local family-focused and community-based clinic and identify some of the early programmatic factors associated with testing.

2. Theory

2.1. Barriers and facilitators to HIV testing in adolescents

Within adults the known barriers to HIV testing are related to socio-economic status with those with a high HIV knowledge, in employment and a higher level of education more likely to test for HIV. Those in urban over rural areas are also more likely to test (Peltzer, Maseke, Mzolo, & Majaja, 2009). In addition, regular conversations about HIV and awareness of anti-retroviral programs are linked to testing in adults (Venkatesh et al., 2011).

The gender difference in HIV testing may be as a result of woman-centred testing initiatives in sub-Saharan Africa. In addition compared to women, men tend to underestimate their risk of HIV infection (Obermeyer & Osborn, 2007). In addition, societal notions of masculinity and their contrast with the perceived persona of individuals that access HIV services have been described as an explanation for low HIV testing in Zimbabwe (Skovdal et al., 2011). On the other hand, men testing and seeking treatment including HIV testing to ensure survival and thus fulfilment of the family role has also been described (Siu, Wight, & Seeley, 2014).

In relation to adolescents specifically, studies from developed countries have found that many high-risk youth do not access testing due to a low perception of risk and not having been offered a test (Peralta, Deeds, Hipszer, & Ghalib, 2007). In addition, being ill and receipt of confidential and quick test results can facilitate HIV testing (Samet, Winter, Grant, & Hingson, 1997).

Research from South Africa has identified that internalized stigma, demonstrated by expression of shame, guilt, and social disapproval towards people with HIV, and fear of stigmatization by others following receipt of a positive result act as barriers to testing (Pettifor, MacPhail, Suchindran, & Delany-Moretwe, 2010). Believing that testing is only for symptomatic individuals, fear of knowing their status (MacPhail et al., 2008) and a lack of knowledge around late presentation of mother-to-child transmission limit testing (Ferrand et al., 2011). A fear of a lack of confidentiality around results from school and clinic based testing plus negative health care worker attitudes are additional known barriers (MacPhail et al., 2009).

Facilitators to testing within South African adolescents have been demonstrated to differ by gender with previous pregnancy the strongest predictor of having received an HIV test amongst females and for young men a positive test result was the strongest correlate. Antenatal care testing as part of a Prevention-of-Mother-to-child-transmission (PMTCT) programs has received much operational and government support in the last 8–10 years. Talking to parents about HIV and frequent clinic visits were also associated with HIV testing for young men as well as women (MacPhail et al., 2009). Within South Africa, the legal framework facilitates autonomous testing from a young age, with testing from the age of 12 years not requiring guardian consent (Kharsany et al., 2012).

2.2. Incentive based Interventions to encourage behaviour change.

Conditional cash transfers are being increasingly applied to HIV prevention with the rationale that improving the socio-economic situation of families through removing structural barriers like education and poverty will reduce HIV risk (Pettifor, MacPhail, Nguyen, & Rosenberg, 2012). To date, research is limited with complexity added through the range of intervention designs, incentives and incentive targets plus additional factors such as cultural contexts; thus more comprehensive studies are required (Witter et al., 2012).

A further approach is contingency management, which has been used successfully in the field of addiction since the 1960s and since then applied to tobacco control and obesity management (Higgins et al., 2012). This method typically involves a tangible incentive (often a voucher) delivered conditional on the patient meeting a predetermined target behaviour (Signon & Patrick, 2012). Behavioural research has characterized why strategies such as contingency management have been effective. One such theory is “bias for the present”, defined as the tendency to prefer immediate over delayed gratification even when the amount of reward associated with the immediate reward is smaller (Bickel & Marsch, 2001). This may be particularly appropriate for the adolescent developmental phase, which in the early stages is characterized by a greater focus on the present as opposed to future planning (Blakemore, Burnett, & Dahl, 2010; Casey, Jones, & Hare, 2008).

HIV testing, which is a discrete, infrequent behaviour is similar to vaccinations or attending clinic visits where contingency management has been successfully applied (Sutherland, Christianson, & Leatherman, 2008). Incentives may compensate for some of the known barriers to HIV testing, including the fear and psychological costs of receiving a positive result and the real costs including time and missed work. The offer of incentives provides an excuse for HIV testing, rather than disclosing that one is concerned about infection therefore revealing engagement in high-risk sexual behaviour or acknowledging illness. Thus incentives provide a mechanism to counteract any anticipated or real social stigma. In some cases the offer of a reward may provide a reason to test, important for individuals with a low risk perception or belief that testing is only for those with symptoms. Although the literature is scarce, two recent studies have demonstrated the role of incentives in facilitating HIV testing with a Malawian study demonstrating that monetary incentives were associated with HIV test result uptake (Thornton, 2008) and in South Africa, providing incentives (in the form of vouchers) to men accessing testing at mobile clinic sites led to a higher HIV yield and reached more previously untested men (Nglazi et al., 2012). To our knowledge, this concept has not been reported as applied to HIV testing within adolescents.

3. Methods

3.1. The Intervention

The DTHF built, designed and implemented a multi-dimensional YC in a community in Cape Town, South Africa. The community
has been described elsewhere, but in brief it is a well-demarcated township of predominantly low socio-economic status with a population of 17 032 in 2010. HIV prevalence among residents ≥15 years of age was 26% in 2008 and reported to be 10.6% in 11–19 year olds in 2006 (Jaspan et al., 2006; Middelkoop et al., 2010).

The YC development was informed by community consultation and focus groups conducted with adolescents and the local community. The YC opened in March 2011 with the objective to reduce HIV, STI and adolescent pregnancy incidence and facilitate young people to reach their full potential by skill development and connection to employment, educational, creative and sporting opportunities.

The YC houses an integrated program consisting of health clinic services, educational and leadership initiatives as well as recreation facilities and programs. The health clinic is staffed by a full-time clinical Nurse Practitioner and focuses on sexual and reproductive health services including provision of contraception, pregnancy testing, STI screening and treatment, HIV testing and adolescent friendly pre- and post-test counseling. This counseling was shared by a trained youth counselor and the YC Nurse. General health services are also provided with referrals made as appropriate.

The education program works closely with the local school and provides assistance with additional tutoring for areas of the school-based curriculum as well as development of basic computer skills and other areas identified by the Youth and the YC staff as requiring attention, including English conversational skills, geography etc. The education program also provides assistance to develop resumes, apply for bursaries and develop work, leadership, life and entrepreneurial skills. The recreation program provides sports and arts activities in many cases partnering with local non-government organizations (NGO) to provide arts, drama and sporting programs. The YC age range is 12–22 years as this was recognized in formative work in the community (Jaspan et al., 2006) as the population stratum potentially at risk for teenage pregnancy, and at increasing risk for HIV and STI acquisition. An adolescent community advisory board (CAB) constituted in 2004 and called the Future Fighters identified lack of private spaces, recreational facilities, career opportunities and confidential, adolescent friendly sexual and reproductive health services as key drivers in the HIV and pregnancy prevalence data reported previously (Jaspan et al., 2006). The Centre is open 5 days a week from 10 am until 5.30 pm and is situated opposite the local High School (which finishes at 2.30 pm).

From January 1 2012 the YC began implementation of a reward program designed, in conjunction with YC attendees, to incentivize positive health, educational and social behaviour. Points named “tutus” are awarded for YC attendance and attendance at various programs. Additional tutus are awarded for milestones towards achieving objectives such as having an HIV test, returning for repeat contraception, completing a resume or a bursary application. Tutus can be accrued and redeemed for various rewards. Rewards include smaller prizes such as vouchers to local supermarkets with larger prizes including cell phones, trips to drama productions and driving lessons (a list of what tutus are awarded, redeemed for and specific values for each activity is attached as Appendix 1).

Demographic, attendance, health clinic and “tutus” data is collected via the “Broccoli” biometric data system. This system was devised and implemented by the DTHF YC staff in partnership with a non-government organization called The Broccoli Project. The system operates via a fingerprint reader connected to an internet-based database. At initial registration basic demographic information is collected and linked to the individual’s fingerprint. When the tutu points are accrued, at the end of a session, program or health visit, the attendee places his or her finger on the print reader and the points are recorded. When signing in, attendees can check the status of the tutus at any time, and if they redeem tutus, this is also recorded in order to keep an individualized running total.

3.2. The evaluation

HIV testing numbers at the YC from July 1 2011 to June 30 2012 (12 months) were compared to numbers within the same age range in the year prior from the local adult community clinic and the concurrent period. The community clinic provided services to the same catchment area as the YC. As the YC does not include an antenatal care service and refers any adolescents with a positive pregnancy test to the clinic the prevention-of-mother-to-child registers were not included in the analysis. Number testing at the YC was reviewed from the Broccoli database with clinic numbers extracted from 2010, 2011 and 2012 HCT clinic registers. Testing numbers were compared by age and gender in the previous 12 months when the YC service had not yet commenced. In order to assess the proportion of adolescents in each age strata who were accessing the YC or the community clinic for HCT, the community based census in 2010 was used for the community denominator. The community census has been described elsewhere (Johnson, Kranzer, Middelkoop, Wood, & Johnson, 2011).

To understand the possible association between HIV testing and the role of the YC, YC HIV testing, attendance, incentives and demographic data from January 1 2012 to June 30 2012 over a 6 month period were analysed. Attendance data were categorized into more or less than 7 YC visits. For the 6 month period the median attendance frequency was 3 visits (interquartile range (IQR): 1, 8.5 visits); thus 7 was in between the median and upper quartile of the IQR and was used as the cut-off between high and low attenders. For the incentive data an active incentive user group was created. This was defined by calculating the total frequency of engagement with the incentive program, from either accruing or redeeming points. The median number of occasions of use of the incentives program was 4 (IQR: 2, 12). Active incentive users were categorized as individuals that over the 6 month period had 8 or more occasions of use of the incentive program, a number between the median and upper quartile of the IQR. These two groups were compared across the HIV testing and non-HIV testing populations at the YC with age and gender controlled for.

Quantitative data were analysed using STATA (Version 11, College Station, Texas, USA). Two sample tests of proportions were used to compare testing rates at the YC and the community clinic and to explore proportions among programmatic factors at the YC. Logistic regression modelling was conducted to explore the predictors of having an HIV test and being a frequent attendee and an active incentive user at the YC adjusting for confounders. Ethics approval was received from the University of Cape Town’s Faculty of Health Sciences Research Ethics Committee.

4. Results

A total of 1187 individuals attended the YC from July 1 2011 to June 30 2012. The median age of participants was 17 years (IQR: 15–19 years), with 63.5% (746) of participants being female.

4.1. YC HIV tests from July 1 2011 to June 30 2012 (comparison of YC and clinic over 12 months)

At the YC 443 individuals had 594 HIV tests over the 12 month period. The mean age of people receiving an HIV test was 17.3 years (SD: 2.62), with 23.2% (138) of males and 68.8% (305) of females receiving tests. There were 3 positive HIV test results in the 18–22 year age group (2 F, 1 M), 77.4% (343) of people received 1 HIV test, while 15.4% (68) received 2 and 7.4% (32) received 3 or more tests. Individuals over the age of 16 years were significantly more likely to have received an HIV test compared to individuals under 16 years (p = 0.002). Females were also significantly more likely to have received an HIV test when compared to males (p = 0.003), with females over the age of 16 significantly more likely to have received an HIV test compared to females under the age of 16 (p = 0.006) (Table 1).
4.2. Representation of the local community population at the YC

From the 2010 community census there were 3200 young people between the ages of 12 and 22 in the local community. A total of 1187 individuals representing 28.2% of the local adolescent community had attended the YC. 19.2% (806) of the local adolescent community is 12–15 years with 80.8% (2414) individuals 16 years and over. This translates to 46.8% (377) of the local community less than 16 year old represented at the YC and 25.3% (810) of the community 16–22 year olds represented at the YC. In terms of gender, 29.4% (441) of males and 43.5% (746) of females have attended the YC from the local community (Table 1).

4.3. HIV testing rates at the YC compared to the community clinic

When the testing rates at the YC were compared to the testing rates at the clinic for the same time interval, July 2011 to June 2012, and the previous year July 2010 to June 2011, significantly less youth overall tested at the YC compared to the community clinic (p < 0.001). However among young people between 12 and 15 years significantly more HIV tests were performed at the YC compared to the community clinic, with 20.6% (166) HIV tests performed at the YC compared to 7.9% (64) and 6.7% (54) at the community clinic in the same and previous year respectively (p < 0.001). When this was analysed by gender; there was no significant difference in numbers of males 12–22 years testing at the YC compared to the community clinic (p = 0.39); however more females 12–22 years tested at the community clinic compared to the YC (p < 0.001). The difference between proportions was greater among males under the age of 16 years with 14.8% more males under the age of 16 testing at the YC in 2011–12 compared to the local clinic (p < 0.001) and 16.4% more males under the age of 16 testing at the YC in 2010–11 compared to the local clinic (p < 0.001). 10.8% more females under the age of 16 years tested at the YC in 2011–12 compared to the community clinic (p < 0.001) and 11.7% more females under the age of 16 tested at the YC compared to the community clinic in 2010–2011 (p < 0.001). For youth over the age of 16 years more individuals tested at the community clinic compared to the YC (Table 1).


When the testing numbers at the clinic were analysed between 2010 and 2011 and 2011 to 2012, there was no significant difference for the number of 12–22 year old males testing at the clinic between the 2 years (p = 0.002). However there was a significant difference in the number of 12–22 year old females testing at the clinic across the two timeframes (p < 0.001), with 4.9% less testing at the clinic in 2011–2012 compared to 2010–2011. When this was analysed by age group, there was no significant difference in the number of 12–15 year old girls testing at the clinic from 2010 to 2012 (p = 0.67) but there was a significant difference in 16–22 year old young women testing at the clinic with a 6.8% reduction in testing numbers at the local clinic from 2010–11 to 2011–12 in 16–22 females (p = 0.0005).

4.5. Analysis of YC data from January 1 2012 to June 30 2012 (period of incentive implementation)

802 young people attended the YC between January 1 2012 and June 30 2012. 62.2% (498) were female and 37.8% (303) were male. Their median age was 17 years (IQR: 14, 19 years). When the age groups were categorized into less than 16 and 16 years or greater; in the under 16 years category there was no significant difference in gender with 55.3% (145) boys and 44.7% (117) girls (p = 0.0144). In the 16 years and over category, significantly more attendees were female with 70.7% (382) of attendees being female and 29.3% (158) of attendees being male (p < 0.001).

4.5.1. YC HIV tests from January 1 2012 to June 30 2012

In this time period, 30.0% (240) of individuals had an HIV test. 233 had 1 test and 7 individuals had 2 HIV tests. The median age of those receiving an HIV test was 18 years (IQR: 15, 19 years) and 65.0% (156) of those receiving a test were female. When the data was categorized into less than 16 and 16 years or greater, significantly more individuals over 16 years tested (67.3%, n = 540) compared to under 16 years (32.7%, n = 262) (p < 0.001). Under the age of 16 years, significantly more males had tested (66.7%, n = 44) compared to females (33.3%, n = 22) (p < 0.001) and significantly more females (77.0%, n = 134) had received an HIV test compared to males (23.0%, n = 40) in the greater than or equal to 16 years age category (p < 0.001).

4.5.2. YC attendance frequency

From January to June 2012, the median attendance frequency was 3 visits (IQR: 1, 8.5) with a range of 1–74 visits. This translated to 69.0% (553) low attenders and 31.0% (249) individuals that had attended >7 times (high attenders). For high attenders there was no significant difference in gender overall (p = 0.7880). For high attenders under the age of 16 years, significantly more high attenders were male at 69.0% (76) (p < 0.001). For high attenders over the age of 16 years, significantly more females were female at 66.2% (92) (p < 0.001). When we performed a logistic regression analysis, there was no demonstrated association between YC attendance and having an HIV test when age, gender and active incentives use were controlled for (p = 0.07) (Table 2).

4.5.3. Use of the incentive program

The median number of occasions of use of the incentive program was 4 (IQR: 2, 12) with a total range of 1–163 occasions of use over the 6 month period. From the 802 individuals that had attended the YC, 32.8% (264) were categorized as active incentive users. There was

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**Table 1**

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>2010 CC population</th>
<th>YC HIV tests 2011 to 2012</th>
<th>Community HIV tests 2011 to 2012</th>
<th>p-value</th>
<th>Community HIV tests 2010 to 2011</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>12–22 years</td>
<td>3200</td>
<td>594 (18.6%)</td>
<td>802 (25.1%)</td>
<td>p &lt; 0.001</td>
<td>844 (26.4%)</td>
<td>p &lt; 0.001</td>
</tr>
<tr>
<td>12–15 years</td>
<td>806</td>
<td>166 (20.6%)</td>
<td>64 (7.9%)</td>
<td>p &lt; 0.001</td>
<td>54 (6.7%)</td>
<td>p &lt; 0.001</td>
</tr>
<tr>
<td>16–22 years</td>
<td>2414</td>
<td>428 (17.7%)</td>
<td>738 (30.6%)</td>
<td>p &lt; 0.001</td>
<td>790 (32.7%)</td>
<td>p &lt; 0.001</td>
</tr>
<tr>
<td><strong>Males only</strong></td>
<td></td>
<td></td>
<td></td>
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<td></td>
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</tr>
<tr>
<td>12–22 years</td>
<td>1501</td>
<td>180 (12.0%)</td>
<td>206 (13.7%)</td>
<td>p = 0.16</td>
<td>165 (11.0%)</td>
<td>p = 0.3905</td>
</tr>
<tr>
<td>12–15 years</td>
<td>370</td>
<td>68 (18.3%)</td>
<td>13 (3.5%)</td>
<td>p &lt; 0.001</td>
<td>7 (1.9%)</td>
<td>p &lt; 0.001</td>
</tr>
<tr>
<td>16–22 years</td>
<td>1113</td>
<td>112 (9.9%)</td>
<td>193 (17.1%)</td>
<td>p &lt; 0.001</td>
<td>158 (14.0%)</td>
<td>p &lt; 0.001</td>
</tr>
<tr>
<td><strong>Females only</strong></td>
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<tr>
<td>12–22 years</td>
<td>1721</td>
<td>414 (24.0%)</td>
<td>596 (34.6%)</td>
<td>p &lt; 0.001</td>
<td>679 (39.5%)</td>
<td>p &lt; 0.001</td>
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<tr>
<td>12–15 years</td>
<td>438</td>
<td>98 (22.5%)</td>
<td>51 (11.7%)</td>
<td>p &lt; 0.001</td>
<td>47 (10.8%)</td>
<td>p &lt; 0.001</td>
</tr>
<tr>
<td>16–22 years</td>
<td>1283</td>
<td>316 (24.6%)</td>
<td>545 (42.5%)</td>
<td>p &lt; 0.001</td>
<td>632 (49.3%)</td>
<td>p &lt; 0.001</td>
</tr>
</tbody>
</table>
no significant difference between gender in active incentive users with 47.3% (125) males and 52.7% (139) females being active incentive users \((p = 0.2230)\). In terms of age groups, significantly more people over the age of 16 years were active incentive users \((p < 0.001)\). When the under 16 years age category were analysed separately, significantly more males were active users, with 69.0% (78) of males active users compared to 31.0% (35) of females \((p = 0.001)\). In the over 16 years age category, significantly more females were active users with 69.8% (104) females active users compared to 30.2% (47) of males being active incentive users \((p = 0.001)\). When we performed a logistic regression analysis active incentive users were 4.3 times more likely to have had an HIV test compared to non-active incentive users when age, gender and YC attendance were controlled for \((CI: 1.96–9.2, p < 0.001)\) (Table 2).

### 5. Discussion

Within South Africa the HIV prevalence in adolescents is high with a cross-sectional survey of the community studied estimating 10.6% of 11–19 year olds infected (Jaspan et al., 2006). Risk behaviours begin early with the same study demonstrating high-risk behaviours in adolescents as young as 11–13 years with a mean sexual debut of 14.6 years (Jaspan et al., 2006), similar to that of the rest of the country (Pettifor, O’Brien, Macphail, Miller, & Rees, 2009). Despite the benefits of HCT in terms of prevention and linkage to HIV care numbers of youth testing for HIV remain low. Across SA they were estimated to be 25% for females and 15% for males in a national survey (Pettifor et al., 2005), with a cross-sectional study of an outpatient clinic in Durban in 2008–9, demonstrating testing number for adolescents (defined as 12–17 year olds), less than young adults (18–24 year olds), with only 21% of 12 year olds receiving a test and almost 20% less adolescents receiving a test compared to adolescent girls (Ramirez-Avila et al., 2012). Similar numbers were reflected at the local clinic with 35% of 12–24 year old females and 14% of 12–24 year old males testing. In 2010–11 only 1.9% \((7)\) 12–15 year old boys had tested at the clinic, with 8.2% less males compared to females testing at the clinic in 12–15 year age category. As, antenatal testing data is not included in the analysis, these gender differences cannot be explained by routine prevention-of-mother-to-child-transmission testing. However females are recognized to have a higher HIV prevalence in comparison to their male counterparts from adolescence to adulthood in South Africa (Kharsany et al., 2012; Shisana & Rehle, 2009) which may be a contributor. As risk behaviours begin early and there are a high number of undiagnosed perinatal infections, it is imperative that testing numbers increase among youth.

At the YC we demonstrated a significant increase in testing rates over the same time period and the previous 12 months compared to the community clinic, in youth aged 12–15 years with testing increases of 12.7% and 13.9% respectively \((p < 0.001)\). The increased proportion was similar across genders, with more girls \((22.5\%)\) testing than boys \((18.3\%)\). In the 16–22 age group more young people tested at the clinic; however there was a 6.8% reduction in testing numbers at the local clinic from 2010–11 to 2011–12 in 16–22 year old females. It is possible that this reduction is due to more young women testing at the YC compared to the community clinic as the YC clinic has gained popularity and is seen as a safe space to access these services. However as there was no significant difference in number testing at the clinic in other age and gender groups between the two timeframes it could be that the YC is appealing to a different demographic than individuals who choose to test at the community clinic. Further analysis into the characteristics of those attending and not attending the YC is warranted. The increase in 12–15 year old testing is encouraging given that to date only 46.8% of the local young adolescent community is represented at the YC. As the follow-up period is relatively short additional changes may be seen over time as the initial novelty of the program may dissipated; however as the YC launch is relatively recent and increased promotion is planned, there is potential for its reach to extend further into the local community over time.

The literature on incentives and HIV testing is limited particularly as regards the evaluation of such strategies within adolescents. It is possible that within the YC program, incentives have played a role in the differential HIV testing rates seen at the YC. The incentive program has only been effectively running for the latter half of this study period but available data suggests that within the YC program, active incentive users were 4.3 times more likely to have an HIV test compared to non-active incentive users \((p < 0.001)\), when age, gender and attendance frequency were controlled for. The incentive program appealed to more boys under 16 years compared to girls, with 69.0% of active incentive users in this age category male. Repeat visitors within South African YCs with a recreation focus are often young males whereas females are more likely to attend for clinical services (Erukik, Bekinska, & Cecbekulu, 2001). Our YC demonstrated a similar pattern of behaviour. In addition, the incentive program design and specific reward targets were developed in close collaboration with YC members. This early data strengthen the potential role for incentives to facilitate testing among young adolescents at YCs in particular males who often do not receive testing at community clinics and do not attend YCs for clinical services. Ongoing monitoring and evaluation of this aspect of this YC program are important.

In biological development terms adolescents may be more susceptible to behaviours driven by rewards through the imbalance in maturity between the limbic system (which governs reward processing and pleasure seeking), which develop earlier in adolescence than the prefrontal cortex (which governs rational decision making) (Blakemore et al., 2010; Casey et al., 2006). This may be a contributor to the appeal

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Table 2

Results for multivariable logistic regression analysis on the effect of independent variables on testing or not testing for HIV at the Youth Centre.

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>Not testing</th>
<th>Testing</th>
<th>Unadjusted OR (CI)</th>
<th>Adjusted OR (CI)</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total</td>
<td>562 (70.1%)</td>
<td>240 (29.9%)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Gender</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Female</td>
<td>343 (68.7%)</td>
<td>156 (31.3%)</td>
<td>1.2 (0.9–1.6)</td>
<td>1.2 (0.8–1.6)</td>
<td>0.39</td>
</tr>
<tr>
<td>Male</td>
<td>219 (72.3%)</td>
<td>84 (27.7%)</td>
<td>1.0</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Age</strong> (12–22 years)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>159 (60.2%)</td>
<td>105 (39.8%)</td>
<td>1.97 (1.4–2.7)</td>
<td>4.3 (1.96–9.2)</td>
<td>0.001</td>
</tr>
<tr>
<td>No</td>
<td>403 (74.9%)</td>
<td>139 (25.1%)</td>
<td>1.0</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Active incentive user</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>157 (63.1%)</td>
<td>92 (36.9%)</td>
<td>1.1 (1.0–1.1)</td>
<td>0.5 (0.2–1.1)</td>
<td>0.07</td>
</tr>
<tr>
<td>No</td>
<td>405 (73.2%)</td>
<td>148 (26.8%)</td>
<td>1.0</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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Note: All analyses were conducted using SAS 9.2.
of the incentive program to younger adolescents in particular boys and provide a mechanism to overcome the barriers to HIV testing. The future challenge will be to see how this transitions into adult behaviour.

Although there have been promising results in the utilization of incentives for health behaviour change and HIV prevention including HIV testing, (Pettifor et al., 2012) their use is currently controversial with mixed outcomes and more robust research called for in particular due to the range of variables to be considered including program design, value of incentives, behavioural targets and the local context (Kohler & Thornton, 2012; Witter et al., 2012). Furthermore, questions have been raised around the ability of incentives to achieve sustained behaviour change, their cost effectiveness as well as moral considerations such as that incentives may undermine intrinsic motivation, be coercive and alter the health practitioner–patient relationship (MarteaU, Ashcroft, & Oliver, 2009; Pettifor et al., 2012). The entire YC framework is focused on healthy behaviour choices and developed in conjunction with the youth; it is hoped that this ethos facilitates sustained behaviour change and individual choice rather than coercion and one-off activities. These factors will need to continue to be monitored over time as well as the program's cost effectiveness and sustainability.

As this was operational research it is difficult to identify all determinants of the increase in HIV testing among the young adolescents at the YC. Masiphumelele is a well demarcated community primarily serviced by one health clinic and the catchment area for the YC. Thus comparison between the YC and local community clinic ensures that similar adolescents in each program are compared. Comparison with the previous year clinic HIV testing numbers provides an indication of the baseline level of HIV testing in the community. Comparison of the same year provides an indication of any potential shift towards the YC from the community clinic and any differences between testing numbers at the clinic with the year prior.

Despite the unique and unusual nature of this clinic and YC, this comparison doesn't control for all confounding factors that may have occurred between these two very different programs in different calendar years; thus the comparison described here should be viewed carefully. Changes may have occurred in the community such as testing campaigns with a survey conducted in 2008 demonstrating that 27% of the community had received an HIV/AIDS education talk and 11% had received information through participation in HIV research (Mall, Middelkoop, Mark, Wood, & Bekker, 2013). This may have influenced testing practices as it was well described that increased knowledge around HIV is associated with a reduction in stigma and increased testing (MacPhail et al., 2008; Mall et al., 2013; Young et al., 2010). There may have been other sources of testing over the different calendar years such as mobile testing vehicles or individuals may have tested at both sites in 2011/12. The YC is also situated outside the community opposite the high school, providing easy access for youth and removing some of the barriers around attending a clinic within a community and the impact of this important facilitator was not specifically measured. Whilst, no overt changes occurred, it is conceivable that management changes at the local clinic may have had positive or negative impact on testing practices at community level. YC programmatic factors have also changed throughout the study period especially in terms of diversity of programs and individuals had different entry points into the overall program. The YC itself is complex, with multi-dimensional programming including educational, leadership and recreational activities. Individual components of the YC model will need to be further explored to understand their role in facilitating HIV testing.

The adolescent clinic at the YC strived to incorporate key components of the WHO framework for development of YFHS (Tylee et al., 2007). This variable was not specifically measured and may have been a contributor to increased HIV testing. Despite this framework, the fact that housing a clinic within a YC and incorporating an incentives approach may have contributed to increased HIV testing in this community adds a new dimension to the implementation of this YFHS framework and strategies to increase the uptake of health services by adolescents.

6. Conclusion

A YC program in Cape Town, South Africa, led to significant increases in testing among young adolescents (12–15 years) in comparison to a community clinic in its first year of operation. We recognize that this comparison has limitations but at the same time provides some comparator against which to gauge the performance of the testing services at the YC. The data presented here may suggest that a reward program integrated within a comprehensive YC service provided a novel approach to encouraging youth to increase their HIV testing behaviour. It is possible that other positive health, educational and social behaviours may also be encouraged and this is currently being tracked. The data would also suggest that the reward program appealed in particular to young adolescent boys who are often missed through traditional testing campaigns and clinical health services. As HIV prevalence is known to be high amongst adolescent females and testing uptake particularly poor amongst young males, understanding the specific programmatic factors that led to increased testing behaviour at the YC, in particular the role of incentives warrants further attention.

Acknowledgements

We would like to thank the Desmond Tutu HIV Foundation YC staff and volunteers (in particular Julia Monk) for all their hard work, dedication and commitment. We would also like to thank Marc Anthony Zimmerman (Broccoli Project co-founder) for his invaluable contribution to this project and for setting up and maintaining the biometric system (additional information on the Broccoli Project available at URL http://broccoliproject.org/). In addition, thank-you to the Masiphumelele clinic and community for their continued support.

Appendix 1

Example of Youth Centre activities and attached tutu allocations.

<table>
<thead>
<tr>
<th>Activity</th>
<th>Allocated tutus</th>
<th>Frequency of earning</th>
</tr>
</thead>
<tbody>
<tr>
<td>General</td>
<td></td>
<td></td>
</tr>
<tr>
<td>General attendance</td>
<td>1</td>
<td>Daily</td>
</tr>
<tr>
<td>Health</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Clinic visit</td>
<td>1</td>
<td>Every 2nd day</td>
</tr>
<tr>
<td>HIV test</td>
<td>100</td>
<td>Four times a year</td>
</tr>
<tr>
<td>STI screening</td>
<td>100</td>
<td>Four times a year</td>
</tr>
<tr>
<td>Health education session</td>
<td>5</td>
<td>Once a week</td>
</tr>
<tr>
<td>Sports &amp; recreation</td>
<td></td>
<td></td>
</tr>
<tr>
<td>District soccer competition</td>
<td>20</td>
<td>Every 2 months</td>
</tr>
<tr>
<td>Soccer best player</td>
<td>80</td>
<td>Every 2 months</td>
</tr>
<tr>
<td>District netball competition</td>
<td>20</td>
<td>Every 2 months</td>
</tr>
<tr>
<td>Best netball player</td>
<td>80</td>
<td>Every 2 months</td>
</tr>
<tr>
<td>Drama class</td>
<td>1</td>
<td>Once a week</td>
</tr>
<tr>
<td>Gumboot dancing class</td>
<td>1</td>
<td>Once a week</td>
</tr>
<tr>
<td>Music development program</td>
<td>1</td>
<td>Once a week</td>
</tr>
<tr>
<td>Education program</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Typing lessons</td>
<td>5</td>
<td>Every 10 days</td>
</tr>
<tr>
<td>Using the internet</td>
<td>5</td>
<td>Every 10 days</td>
</tr>
<tr>
<td>English tutoring</td>
<td>5</td>
<td>Once a week</td>
</tr>
<tr>
<td>Maths tutoring</td>
<td>5</td>
<td>Once a week</td>
</tr>
<tr>
<td>Career and vocational training</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Career guidance session</td>
<td>5</td>
<td>Once a week</td>
</tr>
<tr>
<td>Vocational support</td>
<td>5</td>
<td>Once a week</td>
</tr>
<tr>
<td>Computer skills</td>
<td>5</td>
<td>Once a week</td>
</tr>
<tr>
<td>Education milestones</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Obtainment of an ID book</td>
<td>50</td>
<td>One off activity</td>
</tr>
<tr>
<td>Obtainment of a bank account</td>
<td>40</td>
<td>One off activity</td>
</tr>
<tr>
<td>Completion of a resume</td>
<td>40</td>
<td>One off activity</td>
</tr>
<tr>
<td>Completion of a job application</td>
<td>40</td>
<td>Four times a year</td>
</tr>
<tr>
<td>Completion of a tertiary education application</td>
<td>40</td>
<td>Four times a year</td>
</tr>
<tr>
<td>Bursary application</td>
<td>40</td>
<td>Four times a year</td>
</tr>
</tbody>
</table>
