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The outcomes of a sport-based intervention on risky sexual behaviours among rural school-going adolescents

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Abstract

The spread of HIV infection in sexually active adolescents and young adults has been attributed to the increasing risky sexual behaviours including early sexual activity, multiple sexual partnership, and irregular condoms use in this population. There are increasing calls to scale up youth-friendly HIV prevention programmes to assist youth in adopting safe sexual behaviours. The objective of this study was to assess the effectiveness of a 12-week sports-based HIV prevention programme on the HIV-risk reduction outcomes among rural high school learners. Participants are 430 learners representing 250 learners in the intervention school and 180 learners in the control school respectively. The intervention was delivered in school using the *Grassroot Soccer generation skills* curriculum consisting of soccer-themed HIV prevention activities including knowledge about HIV risks, self-efficacy to be abstinent and resist peer pressure. A one-way repeated measures ANOVA conducted to compare risk behaviour reduction outcomes at Time 1 (prior to the intervention), Time 2 (following the 12-week intervention) and Time 3 (four-month follow up) showed improvement in HIV knowledge [F (2) = 72.57, p = 0.000], self-efficacy [F (2) = 6.63, p = 0.002] and negotiation skills [F (2) = 4.07, p = 0.02]. Logistic regression analysis comparing risk reduction outcomes between intervention and control group showed statistically significant difference only on self-efficacy scores [β = 1.43 (95% CI: 1.07-1.92); p = 0.018]. There were no significant findigns regarding effect of sport-based HIV prevention programmes on risky sexual behaviours in rural school-going adolescents. The potential effect of the intervention on improvement of HIV knowledge, self-efficacy to refuse sex and negotiation skills for safe sex indicated that sport-based HIV prevention programmes could be used to modify risky sexual behaviours in South African adolescents and young adults.

Keywords: Human Immunodeficiency Virus (HIV), HIV risk factors, sub-Saharan Africa, HIV knowledge, self-efficacy, peer influence.

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Introduction

Many adolescents and young adults between the ages of 15 to 24 years are increasingly becoming sexually active and face a preponderance risk of contracting HIV infection (Doyle, Mavedzenge, Plummer & Ross, 2012). Young people between the ages of 15-25 account for an estimated 50% of the HIV incidence globally (United Nations Joint Programmes on HIV/AIDS) (UNAIDS, 2010). The spread of HIV infection in sexually active youth has been attributed to risky sexual behaviours including early sexual activity, multiple sexual partnerships, and irregular condoms use (Doyle et al., 2012). To respond effectively to problems of risky sexual behaviours in adolescents, United Nations General Assembly Sessions on HIV/AIDS (UNGASS) advocated for more efficient youth-friendly approaches to assist youth in adopting safe sexual behaviours (UNGASS, 2006). In response, school-based HIV prevention and life skill are increasingly receiving a wider coverage to modify behaviour change in youth.

A systematic review of all these school-based programmes found that nearly 65% of the studies reviewed improved HIV knowledge and self-efficacy to abstain from early sex or avoid multiple sexual partners (Ross, Dick & Ferguson, 2006; Harrison, Newell, Imrie & Hoddinott, 2010; Mavedzenge, Doyle & Ross, 2011). Although, the number of schools providing access to HIV preventions is increasing lately, however the number stays low. For instance, HIV life skill programmes are not part of the curriculum in most schools in Africa (Rutenberg et al., 2011), and where such programmes exist, they are too classroom-based and offer little space for youth to be actively involved (United Nations Educational, Scientific and Cultural Organization, UNESCO, 2008). Harrison et al. (2010) recommended the need to promote group-based learning over didactic teaching. One of such group-based approaches to modify behaviour change in recent years is through HIV-focused sport activities, which are increasingly receiving a wider coverage globally (United Nations Inter-Agency Task Force, 2003). The potential of sport as a driver of behaviour change is rooted in the fact that sport develops friendship, loyalty, resilience, respect, leadership and team spirit. For this reason, sport-based approaches promote participatory learning and create a safe environment for open communication about HIV-risk behaviours (Koss & Alexandrova, 2005).

However, sport-based HIV prevention interventions especially in schools are few, albeit participation in sports among young people and the strength of evidence to support the widespread implementation of sport-based HIV intervention is weak. Sport-based HIV prevention studies over the last ten years have demonstrated a diverse range of weakness that may cast a cloud on the effectiveness of sport intervention to reduce HIV infection. These include short duration of interventions (Clark, Friedrich, Ndlovu, Neilands & McFarland, 2006; Maro, Roberts & Sorensen, 2009; Kaufman, Welsch, Erickson, Adams &

Ross, 2012) and use of cross-sectional data (Delva et al., 2010) which make it difficult to link studies outcomes to the effect of intervention. Even, in a recent quasi-experimental study (Kaufman et al., 2012), the small sample size and high a dropout rate in the study could also over-estimate the true intervention effect. In addition, the majority of sport interventions developed to date did not measure sexual behaviours (age of sexual debut, multiple sexual partnership, and inconsistency of condom use) but based their measures on only proxy measures of a behaviour change (Clark et al., 2006; Maro et al., 2009; Kaufman et al., 2012).

In addressing these limitations in sport-based approaches, a more robust design with a larger sample size, an adequate follow-up period and details of intervention activities will address the knowledge gap in sport-based HIV prevention approach. At the same time, recognition of variation in HIV prevention approaches and that no "one size fits all" strategy is enough to prevent sexual transmission of HIV remain a driving force to stem the tides of HIV infection in youth. There are increasing calls to scale up many evidence-informed HIV prevention interventions and innovative approaches that are youth-friendly (UNICEF, 2011). The study was therefore, conducted in a way that it will promote participatory learning and to provide sufficiently strong recommendation that will help to promote widespread implementation of sport-based HIV prevention measures in sub-Saharan African schools. The objective of this study was to determine the outcomes of a 12-week sports-based HIV prevention programme on the HIV-risk behaviours among high school learners.

Methodology

Study setting

The setting for the study was a town in the Witzenberg Local Municipality, Cape Winelands District of the Western Cape Province. In 2011, Cape Winelands district had an estimated 13.2% of the total population of the Western Cape and predominantly employed in the Agriculture sector (Regional Development Profile Cape Winelands Distcrit 2011 Working Paper). The majority of the learners come from key neighbouring towns. There are four high schools, the majority of the learners are Afrikaans speakers and children of farm workers. In 2011, a study from non-Metro districts (Cape Winelands, West Coast, Eden, Central Karoo, Overberg) among grade 8-10 learners, on the prevalence of adolescents' risky behaviours including lifetimes alcohol use (67.9%), cannabis use (21%), sexual activity (30.1%) and sex before age 15 (52.1%) were high (19). This was the basis for choosing the setting for our study.

Sample

The study sample comprised four high schools in the town. Only two schools agreed to participate in the study and the total population of the two schools that participated in the study was about 1200 learners from grade 8 to grade10. The learners in grades 11 and 12 were excluded from the programme because of their inability to participate in the intervention and follow-up programme as the Western Cape Education guidelines clearly stipulates that no learners can be involved in research activities in their final year of school. The two schools have an appreciable distance of 10 km between them in order to reduce the effect of contamination of intervention.

Study design

This was a pre-test and post-tests quasi-experimental evaluation study. This methodological approach examined the impact of a sport-based intervention on HIV-related risky sexual behaviours and proxy outcomes of behaviour change.

Sample size estimation and sampling

The sample size was estimated from 1200 learners from two high schools that were willing to participate in a 12-week sports-based programme. Sample size was calculated using a dichotomous outcome variable (one sexual partner in the last 12 months vs. more than one sexual partner in the last 12 months) (Hulley, Cummings, Browner, Grady & Newman, 2007). The sample size was estimated as follows:
P_1 = anticipated reduction in the proportion of learners in experimental school who have more than one sexual partner to about 10%

P_2 = anticipated no reduction in the proportion of learners in control school who have more than one sexual partner. Difference between proportion = 0.1
To detect the difference between the two group of learners at α 0.05 (two –sided) and 80 % powered ($\beta = 0.2$) and level of confidence set at 95%, this study design would require 219 learners per school.

The two schools that agreed to participate had a similar number of learners (35-40) and clasrooms (4 classrooms in each grade) from grades 8 to 12. However, the learners in 11^{th} and 12^{th} grades were excluded to avoid the disruption of academic activities. This is in accordance with the Western Cape Department of Education guideline that stipulates that no learners can be involed in any research during the final year of school (12^{th} grade). The follow-up data for the intervention programme were to be collected the following year, and therefore 11^{th} grade learners were also excluded. The school with availability of materials and logistics to conduct intervention was chosen as an intervention school; the

second school served as a control arm of the study. Two classrooms each from grade 8 to 10 were randomly selected to participate in the study. Thus, learners in six classrooms in both intervention and control schools contributed to the baseline and follow-up data. The final sample consisted of 430 learners representing 250 learners in intervention school and 180 learners in control school respectively. For the first follow-up measure after four-weeks, 340 learners completed the post evaluation measure (Intervention = 215; control = 145). For the second follow-up measure after 16 weeks, only intervention school participated in the data collection. Control school declined to participate in the second follow-up data collection, as students were busy preparing for the examinations

Intervention

The intervention commenced two weeks after the baseline data were collected in both the intervention and control school. A total of six peer educators delivered 66 game-based sessions to 250 learners from grades 8 to 10 learners for 12 weeks. Two peer facilitators were available to teach "one practice" per class per week. The intervention was delivered in school using the English version of *Grassroot Soccer generation skillz* curriculum consisting of 11 practice sessions (Figure 1). Each of these 11 practices is based on soccer-themed activities including open discussions about HIV, peer pressure, awareness of gender roles, sexual risks awareness, stigma and discrimination, voluntary counseling and testing, and caring for people living with HIV and AIDS among others. The *Grassroot Soccer generation skillz* manual has 11 core sessions (Figure 1) using interactive soccer-based languages, themes, and activities that are delivered by trained peer educators to provide comprehensive HIV prevention and life skills education to modify positive behaviour change. The GRS *generation skillz curriculum* draws on two theories of behaviour change Theory of Planned Behaviour (Ajzen, 1991) and Social Cognitive Theory (Bandura, 1986), which build on developing life skills to promote positive behaviours.

For example, in practice 3 (Risk Field) - "*participants dribble a soccer ball in between cones representing HIV-related risks—multiple partners, drug/alcohol abuse, sugar daddies, etc. If one player hits a cone, he and his teammates must complete 3 push-ups, showing how the consequences of one person's risk can not only affect him, but also his friends, family, and community"* (http://www.grassrootsoccer.org/what-we-do/skillz/).

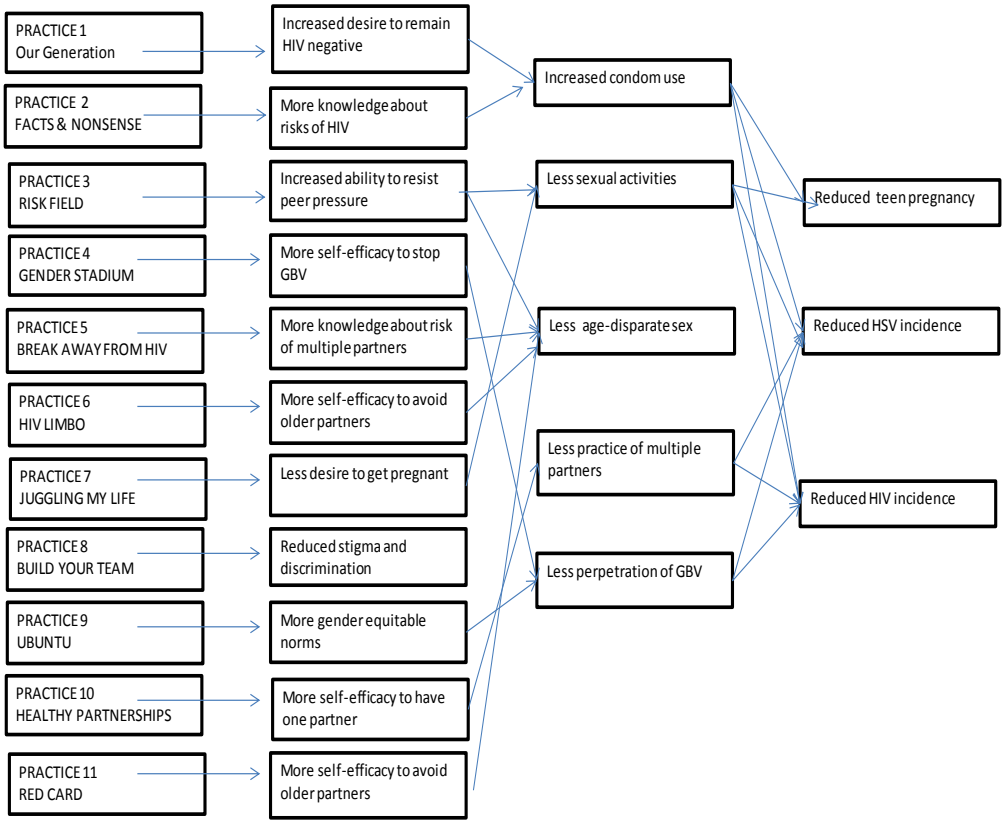

Figure 1: *Grassroot Soccer generation skills* curriculum. Permission to use manual from GRS: www.grassrootsoccer.org

Challenges of running sport-based intervention in school

The major challenge was the lack of pre-existing structures and platforms in implementing HIV prevention interventions in schools and this was a source of concern for sustainability and buy-in. Logistic reasons made it impossible to train grade 12 learners as peer educators because of their impending matric examinations; the peer educators that implemented the programme were from a different demographic setting and they felt it was difficult to mobilize the learners in the first week. Moreover, it was extremely difficult for learners to participate in the programme after school hours despite reaching an agreement with the school prior to the study. The programme was nested within Life Orientation subject period during school hours, however time allocated was too short to complete all the relevant exercises in each sessions. Overall, peer educators felt low level of HIV knowledge among learners in this school made it impossible to finish each session within allotted time as they had to spend more time than when necessary.

Intervention in the control school

No HIV-focused sports activities took place in the control school except the usual Life Orientation subject that is compulsory in all the schools in South Africa. However, we attempted to conduct a one-week intervention in control school, but the offer was declined because it was close to the exams period.

Measures

The data were collected using a self-administered questionnaire. All the learners in both schools completed a self-administered baseline questionnaire in February 2011. Each learner was given a numeric code at baseline measure and this code was used in two subsequent follow-up measures (post-test 1 and post-test 2) to link specific data in each evaluation. We collected post-test 1 and post-test 2 four weeks and four months after the end of intervention in schools.

Sexual behaviours scale

Sexual behaviours were assessed using a self-administered questionnaire adapted from the subscale "*sexual activity"* of the Youth Risk Behaviour Surveillance System (YRBSS) developed by the Center for Disease Control and Prevention (CDC). The YRBSS has been utilised among adolescents both in developed and developing nations including South Africa (Reddy, James & McCauley, 2003). This scale was used to measure the age of first sexual intercourse, condom use at first and last sexual contacts, and number of sexual partners. The learners were requested to report whether they were sexually active (0 = No, 1 = Yes), age of sexual debut (0 = ≤ 14 years, 1 = > 14 years), lifetime sexual partners (0 = one sexual partner in the past 12 months, 1 = more than one sexual partners in the past 12 months), consistency of condom use (0 = sometimes/Never, 1 = Always) and condom use at last sexual contact (0 = No, 1 = Yes).

Proxy measures of a behaviour change

(a) HIV- Knowledge scale

The HIV-KQ-18 is a self-administered questionnaire (Carey & Schroder, 2002) that measures the knowledge of HIV transmission, prevention, and misconception about HIV infection. It consists of 18 items dichotomised into 1 = 'True' and 0 = 'False or Don't Know'. A total score for each participant was constructed on a continuous scale by adding the number of correct answers ranging from 0 to 18 with higher scores indicating more knowledge of HIV/AIDS in heterosexuals with low level of education (Cronbach's alpha coefficient = 0.75-0.89).

(b) Self-efficacy to refuse sex scale

This scale was designed to assess sexually active and sexually inexperienced learners' self-efficacy to refuse sex (Basen-Engquist et al., 1999). The scale consists of 4 items with a 5-point Likert scale ranging from V*ery sure* to *Not very sure*. An example of items is: '…imagine your partner, he or she wants to have sex but you don't feel ready, how sure are you could keep from having sex until you feel ready. Higher scores indicate higher perceived ability to refuse sex. Internal consistency (Cronbach's alpha) was 0.70.

(c) Peer influence scale

This measure from Basen-Engquist et al. (1999) assessed with four items the influence of perceived peer sexual activities on one's own sexual behaviours. Each item was scored as 1 for 'None' and 5 for 'All' response. Item scores were then added together across the 4 items and total average scores ranging from 1 to 5, with higher scores indicating greater possibility of being influenced by friend's sexual behaviour (Cronbach's alpha = 0.78). Examples of items are: 'How many of your friends believe people of your age should wait until they are older before having sex?', and 'how many of your friends believe it is okay now for people of your age to start having sex?'

(d) Sexual communication and negotiation skills scale

Learners responded to a series of questions assessing sexual communication and negotiation skills, adapted from the Assertive Sexual Communication Scale (Deiter, 1994). Learners rated each item using a 5-point Likert scale ranging from strongly agree to strongly disagree across 11 items (internal consistency, $\alpha = 0.93$). Examples of items are: 'I would want to know if my partner has ever had a HIV test', 'Most of the time we do what my partner wants to do'. Higher scores indicate higher skills for communication and negotiation skills.

(e) Time perspective scale

Zimbardo Time Perspective Inventory (short form) was used to collect present time perspectives (hedonistic and fatalistic) and future time perspective (Zimbardo & Boyd, 1999). The measure was used to determine the impact of time perspective as a predictor of risky sexual behaviour among the participants. Measure consists of three sub-scales (present hedonistic, present fatalistic and future perspective). Future orientation was expected to be a negative predictor and present orientation a positive predictor of risky sexual behaviour. Answers are given on a five-point Likert scale across 27 items ($\alpha = 0.80, 0.74, 0.81$ respectively).

Cronbach's alpha coefficient was calculated to see how the scales were relevant to our setting. All scales were found to be reliable with Cronbach's alpha value for each to be above 0.70 (DeVellis, 2003). The "Attitude towards condoms" scale was not used because the value was below 0.7

Ethics approval

The Ethics Committee at the University of the Western Cape gave ethical approval (Research Proposal Registration Number: UWC/10/1/15). Permission to conduct the study was obtained from the Western Cape Education Department (WCED). Teachers in selected classes distributed the study information booklet containing the study information, parents/guardians signed consent forms and learners' signed informed assent forms. The teachers emphasized their voluntary participation, ability to withdraw from the study and assured of each learner's dignity, respect, privacy, confidentiality and anonymity. Only learners with signed parent consent forms and learners' assents forms and in class on the day of data collection were included in the study sample. Only learners who completed baseline questionnaire participated in 12-week programme. The final sample consisted of 435 learners representing 250 learners in the intervention school and 180 learners in control school.

Data analysis

Data were analysed using Statistical Package for the Social Sciences (SPSS) version 20.0. The aanalysis plan focused on assessing changes in sexual behaviours and proxy measures of behaviour change following sports-based intervention. For categorical variables (sexual behaviour), Pearson Chi-square test was used to assess the changes in sexual behaviour outcomes between intervention and control group. For learners who participated in the sports-based intervention, paired t-test to assess changes in proxy measures of behaviour for HIV prevention collected at baseline and post-test 1.

A one-way repeated measure ANOVA was used to assess the within-group differences on proxy measures of behaviour measured at three different time periods in learners who took part in the intervention programme (baseline, post-test 1 and post-test 2). If a significant difference exists among the three points, follow-up post-hoc comparisons using paired t-test was conducted to find out which pair wise group were significantly different from one another (baseline vs. post-test 1; baseline vs. post-test 2; post-test 1 vs. post-test 2). Furthermore, difficult logistics made it impossible to collect post-test 2 surveys in control school; repeated measures could not be performed in the control group. To adjust for observed baseline differences between the two groups, a binary logistic regression test (Forward-Stepwise) was performed to assess the intervention

effects of sport-based HIV prevention intervention on reported sexual behaviours and proxy measures of behaviour change for HIV prevention.

To measure the effect of the intervention on selected sexual behaviours and proxy measures of behaviour change for HIV prevention, we entered the study condition (Intervention =1, Control = 0) as dependent variable and sexual behaviours and proxy measures of behaviour were entered into the model as covariates. The odd ratios were interpreted as overall treatment effect.

Results

Participants' baseline characteristics

Table 1 shows the proportions of learners who completed the baseline and post-test 1 survey. The average age of the learners was 15.21 and ages ranged from 13 to 18 years (Table not shown). The majority of the learners in the two schools were predominantly from "Coloured" population group. Both schools had the same social-demographic characteristics except control school, which had significantly lower learners in grade 10. However, the two schools varied significantly on sexual behaviours. The learners from intervention school were significantly more sexually active and reported inconsistent condom use compared to control school (Table 1).

Regarding the proxy measures of a behaviour change, no significant difference observed between the two schools. However, for HIV knowledge, the results of independent t-test showed that learners in the control school had significantly higher HIV knowledge scores than did learners in the intervention school (Control: Mean = 8.85, SD = 3.06; Intervention: Mean = 8.04, SD = 2.88; t = 2.71, p = 0.01) (Table not shown).

Table 1: Baseline demographics and sexual behaviours differences

Variables	Intervention N (%)	Control N (%)	χ^2	*p*
Gender				
Female	127 (50.4)	99 (55.6)	1.82	.33
Male	125 (49.6)	79 (44.4)		
Age group				
> 14 years	181 (74.2)	118 (44.4)	1.46	.23
≤ 14 years	63 (25.8)	54 (55.6)		
Population group				
Coloured	220 (92.4)	168 (96.6)	0.14	.14
Black	10 (4.2)	1 (0.6)		
White	6 (2.6)	2 (1.1)		
Indian/Others	2 (0.8)	3 (1.7)		
Grade				
8	81 (31.9)	74 (41.3)		
9	90 (35.4)	74 (41.3)	6.76	.002[a]

Variables	Intervention N (%)	Control N (%)	χ^2	*p*
10	83 (32.7)	31 (17.3)		
Socio-economic				
status	78 (31.2)	65 (36.6)		
High	130 (51.8)	87 (48.8)	1.74	.22
Average	42 (17)	26 (14.5)		
Low				
Sexual Behaviours				
Sexually Active	166 (67.8)	138 (79.3)		
No	79 (32.2)	36 (20.7)	6.82	.01[a]
Yes				
Age of first sex	41 (51.9)	16 (44.4)		
≤ 14 years	38 (48.1)	20 (55.6)	0.55	.45
> 14 years				
Multiple partners	44 (63.8)	15 (42.9)		
One	25 (36.2)	20 (57.1)	4.14	.04[a]
More than one				
Condom use at last	40 (54.1)	18 (51.4)		
sex	34 (45.9)	17 (48.6)	0.07	.92
Yes				
No	29 (44.6)	25 (75.8)		
Consistency of	36 (55.4)	8 (24.2)	8.58	.003
condom use				
Always				
Irregular				

a Chi-square p value, intervention group versus control group significant at p< 0.05. The number of respondents varied for variables because of missing data.

Table 2 shows the results of the comparison of risky sexual behaviours and proxy measures of behaviour change between the intervention and control school. After adjustment for baseline differences, the results showed no significant differences between the intervention and control schools on any measures of sexual behaviours after the intervention (p< 0.05) (Table 2).

Table 2: Treatment status predicting change in sexual behaviours and proxy measures of behaviour

	B	p-value	Odds ratio (95% C.I) Treatment main effect[a]
Sexual behaviours			
Lifetime sexual partners	-0.38	0.45	0.69 (0.26-1.82)
Condom use consistently	-1.08	0.11	0.34 (0.09- 1.26)
Condom use at last sex	0.51	0.43	1.66 (0.47-5.89)
Proxy measures			
HIV knowledge	0.04	0.50	1.04 (0.94-1.15)
Self-efficacy	0.26	0.018*	1.43 (1.07-1.92)
Communication	0.42	0.09	1.53 (0.93-2.49)
Negotiation	-0.13	0.53	0.88 (0.58-1.32)
Peer influence	0.27	0.12	1.32 (0.93-1.85)
Fatalistic	0.20	0.32	1.23 (0.83-1.82)
Hedonic	-0.10	0.75	0.91 (0.50-1.64)
Future	0.03	0.89	1.03 (0.66-1.60)

[a]Intervention groups are the reference groups, * p<0.05.

The intervention had a significant effect on one of the proxy measures of behaviour change. Learners who participated in the HIV-focused sports activities had a significantly higher self-efficacy score than did learners in control group [$\beta = 0.26$, $p = 0.018$; odds ratio = 1.43 (95% CI: 1.07-1.92)]. Other proxy measures of behaviours showed no significant difference between intervention and control group.

Effects of the programme within the intervention group

A sub-group analysis was performed on only the learners who participated in the 12-week HIV focused sport intervention. Table 3 illustrates effects of intervention on sexual behaviours among learners who participated in 12-week sport activities. The results indicated there were no significant changes on sexual behaviours. However, the proportions of learners who reported to have tested for HIV increased, though the significance was marginal (Table 3).

Table 3: Exposure effect of sport-based HIV intervention on sexual behaviour

	Pre-intervention (%)	Post-intervention (%)	χ^2	*p*
HIV Testing				
N	243	181		
Yes	13.6	20.4	3.54	.06
No	86.4	79.6		
Multiple partners				
N	69	54	.52	.47
One	63.8	57.4		
More than one	36.2	42.6		
Condom use at last sex				
N	74	60	.01	.93
Yes	54.1	53.3		
No	45.9	46.7		
Consistency of condom				
N	65	60	.36	.55
Always	44.6	50.0		
Irregular	55.4	50.0		

Analysis excluded non-sexually active learners. The number of respondents varied for variables because of missing data.

Table 4 shows the results of repeated measures ANOVA tests conducted to assess the sustained effect of intervention on proxy measures of behaviour change over time (baseline, post-test 1, and post-test 2) among the learners that received the intervention. If the ANOVA test was significant, a post-hoc comparison analysis using paired t-test was conducted to assess the sustainability of effect of intervention at short-time (i.e. baseline vs. post-test 1 and long-time respectively (i.e. post-test 1 vs. post-test 2).

Table 4: ANOVA test between-subject effects

Variables	DF	Pa Eta Sq.	F	p-value
HIV Knowledge	2	0.45	72.57	0.000
Self-efficacy	2	0.09	6.63	0.002
Negotiation skills	2	0.07	4.07	0.02
Communication skills	2	0.0004	0.24	NS
Future	2	0.014	0.70	NS
Fatalistic	2	0.009	0.50	NS
Present	2	0.016	0.77	NS

DF = degree of freedom; NS = not significant at $p<0.05$

Regarding the HIV knowledge, a one-way repeated measure ANOVA was conducted to compares knowledge scores at baseline, post-test 1 and post-test 2. The results showed a significant difference in knowledge scores over the three time series. The effect size calculated using eta squared, was 0.45 ($p<0.000$) (Table 4). The post-hoc comparisons using paired t-test indicated that mean scores were significantly different during the three time periods (Table 5).

Table 5: Differences in proxy measures of behaviour by the intervention group before and after the intervention

Time 1	Mean (SD)	Time 2	Mean (SD)	t-test, p-value
HIV knowledge		**HIV Knowledge**		
Baseline	8.14 (2.96)	Post-test 1	9.49 (3.06)	7.27, $p<0.000$
Baseline	8.07 (2.81)	Post-test 2	10.48 (2.17)	12.42, $p<0.000$
Post-test 1	9.54 (2.98)	Post-test 2	10.60 (2.26)	5.01, $p<0.000$
Self-efficacy		**Self-efficacy**		
Baseline	3.34 (1.22)	Post-test 1	3.75 (1.17)	3.56, $p<0.000$
Baseline	3.35 (1.27)	Post-test 2	3.72 (1.03)	3.60, $p<0.000$
Post-test 1	3.73 (1.17)	Post-test 2	3.72 (1.01)	NS
Negotiation		**Negotiation**		
Baseline	3.48 (0.79)	Post-test 1	3.60 (0.80)	NS
Baseline	3.43 (0.88)	Post-test 2	3.73 (0.74)	3.96, $p<0.000$
Post-test 1	3.66 (0.78)	Post-test 2	3.78 (0.73)	NS
Communication		**Communication**		
Baseline	1.68 (0.80)	Post-test 1	1.65 (0.87)	NS
Baseline	1.69 (0.80)	Post-test 2	1.74 (0.84)	NS
Post-test 1	1.65 (0.85)	Post-test 2	1.61 (0.75)	NS
Future		**Future**		
Baseline	3.53 (0.64)	Post-test 1	3.53 (0.72)	NS
Baseline	3.52 (0.68)	Post-test 2	3.53 (0.69)	NS
Post-test 1	3.48 (0.72)	Post-test 2	3.49 (0.70)	NS
Present		**Present**		
Baseline	2.76 (0.57)	Post-test 1	2.81 (0.52)	NS
Baseline	2.76 (0.57)	Post-test 2	2.77 (0.54)	NS
Post-test 1	2.80 (0.51)	Post-test 2	2.78 (0.52)	NS
Fatalistic		**Fatalistic**		
Baseline	2.68 (0.72)	Post-test 1	2.61 (0.81)	NS
Baseline	2.69 (0.77)	Post-test 2	2.65 (0.84)	NS
Post-test 1	2.60 (0.80)	Post-test 2	2.59 (0.79)	NS

NS = not significant at $p<0.05$

For self-efficacy, the one-way repeated measures of ANOVA analysis showed that significant differences for self-efficacy scores ($p<0.002$). The calculated eta

squared was 0.09 (Table 4). The post-hoc analyses showed a significant increase in the self-efficacy mean scores at baseline from either post-tests 1 and 2. The mean scores did not differ significantly from post-test 1 to post-test 2 (Table 5

However, for negotiation skills, the difference in the mean scores at the three time series was small ($p<0.02$). The eta squared calculated was 0.07 indicated moderate effect size (Table 4) The post-hoc analysis only showed significant difference between baseline score and post-test 2 (Table 5). No significant differences were observed for communication and time perspectives.

Discussion

The results of the study demonstrate that a sports-based HIV prevention in schools had no significant impact on learners' risky sexual behaviours. These findings are consistent with studies that found about 60% of the HIV prevention interventions did not decrease the proportion of learners in unsafe sex or with more than one sexual partners (Kirby, Laris & Rolleri 2007; Kim & Free, 2008). The lack of significant impact on sexual behaviours is disappointing and we felt that sexually active learners in our study needed a longer exposure to the programme before any meaningful changes can be observed. Thus, Shuey, Babishangire, Omiat and Bangarukayo (1999) earlier observed that intervention targeting already sexually active high school learners are less effective compared to those targeting non-sexually active youth. This emphasizes that HIV prevention initiatives are crucial in the early adolescent years before the youth become sexually active.

Given the lack of significant impact on sexual behaviours, we found that sport-based HIV programme successfully increased self-efficacy to refuse sex among participants in the intervention school compared to control group. This finding is consistent with a review that found more than 65% of the studies appraised had a positive impact on youth by increasing their knowledge and self-efficacy to abstain from unsafe sex (Ross, Dick & Ferguson, 2006). In addition, Rosset al. (2006) observed that self-efficacy is strongest protective factor that decreases the risk of HIV infection in young people.

Our study also demonstrates significant increase in HIV knowledge and negotiation skills. This finding is consistent with a South Africa study that found increased HIV knowledge in five school-based interventions (Harrison et al., 2010). Thus, with increasing HIV knowledge, young people are more likely to use condoms and undergo HIV testing (Haile, Chamber & Garrison, 2007). However, Phillips and Malcolm (2006) cautioned that increased HIV knowledge does not always associate with a positive sexual behaviour change. Although, we observed increased in overall HIV knowledge scores following the intervention, but this information alone is limited to provide a comprehensive HIV awareness

programmes in youth. A step-by-step analysis of individual knowledge items is more desirable. For instance, in the study one of the knowledge questions was to know if HIV infection could be detected one week after sexual encounter. Despite that the proportion of correct response increased after the intervention, 24% (15.4% of the 63.6%) who gave a correct response prior to intervention, gave wrong responses after the intervention. The implication for this misconception is that young people may be unknowingly spreading the virus while at highly infectious stage thinking they are HIV negative. Thus, there is a need for a more comprehensive HIV-related knowledge in all schools in South Africa, especially in rural areas.

The use of sports-activities in the present study improved participation, and provided a safe space, for the learners to freely discuss issues around HIV and sexual behaviours. A key aspect of the study was the low knowledge of HIV among the learners, and the reason for this was the absence of an HIV prevention project in the school. This finding corroborate an earlier observation on the need to introduce a comprehensive sexuality education in early adolescence with a view to addressing risky behaviours in adolescents and young adult (Kirby, Laris & Rolleri, 2007). Our findings also suggest that life skills for HIV prevention in schools cannot be taught as a sit-and-write-test subject but a general knowledge learned in a day-to-day real life situation. Another key aspect of this study was the lack of motivation from the junior learners to openly and freely discuss HIV and sexual behaviour with the out-of-school peer educators. Although several studies have recruited peer educators of the same age and values to deliver school-based interventions (Karnell, Cupp, Zimmerman, Fiest-Price & Bennie, 2006; Jewkes, Nduna, Levin, Dunkle, Khuzwayo et al., 2006), however the low apathy from junior learners might be because we recruited peer educators from outside the setting. It is sometimes difficult to recruit peer educators from school because of lack of existing structures to implement a comprehensive HIV programmes, this finding thus suggest the need to provide enable structures for the success of the sport-based intervention in schools.

In addition, because teachers are better equipped with teaching skills and learning methodologies, their roles in moderating HIV initiatives in schools cannot be undervalued (Jansen & Crewe, 2006). However, the existing moralistic and disciplinary view of HIV education in schools must be reviewed to encourage learners to participate freely in HIV awareness programmes in schools.

Limitations of the study

The findings of the present study should be interpreted in the light of some limitations. Logistically we were unable randomize individual learners in the schools to avoid disrupting their schoolwork, thus this study is open to selection

bias. This study took place in two rural high schools, generalizing the results to the general population of youth in rural areas is limited. Data were collected through self-reported measures, this is open to desirability bias where participants either over-estimate or under-estimate their true sexual behaviour.

Conclusion

There were no significant findings concerning the effect of sport-based HIV prevention programmes on risky sexual behaviours in rural school-going adolescents. Despite this challenge, sport-based HIV prevention activity has shown remarkable improvement in self-efficacy, HIV knowledge and negotiation skills among in-school adolescents. There is a need for future programme to ensure an objective measurement of HIV risk behaviour outcomes and longer intervention duration for promising impact on sexual behaviours.

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