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Effectiveness of Multimodal Therapy in HIV and AIDS Prevention among Men Who have Sex with Men (MSM) in Nairobi, Kenya.

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ABSTRACT

Men who have sex with men (MSM) remain at great risk for HIV infections. This study purpose was to assess effectiveness of MMT intervention in preventing infections among MSM in Nairobi. A quasi-experimental, non-equivalent control-group design with pre- and post-test was adapted. 188 MSM was randomized in Hoymas and Ishtar Nairobi. Findings revealed there was reduced risky behavior in experimental group between pre- and post-test data. This study recommends MMT for psycho-behavioral personality/temperament intervention. It is cost effective; no side effects can be personalized treatment plan and incorporated in HIV treatment. Conclusion: This study demonstrated that MMT was effective in reducing risky sexual behavior among MSM. It can be tailored for individuals psychological and behavioural and as a strategy for dealing with personality and sexual decision making.

Introduction

HIV and AIDS prevalence rate among MSM in Kenya in 2012 was 18.2% of the global population and almost three times that of the country's infected population. Consistent condom use is very low and the rate of multiple sexual partners is very high. The HAART seem to have little impact because of drug side effects, cost and adherence problems (UNAIDS/PWG, 2014). Same gender sexual relationships are criminalized in many countries in Africa and have caused many MSM to become victims of fear of arrest and imprisonment. This has led to many MSM concealing their sexual orientation by living in secluded lifestyles and even avoiding health care services including research on their lifestyle because of stigma and discrimination Sanders, Okuku, et al (2013). This study investigated the Efficacy of Multimodal Therapy skills in HIV and AIDS prevention through risky sexual behavior reduction among MSM in Nairobi, Kenya. Three assessments were administered to both experimental and control groups in order to establish behavior changes between and within the study groups. Kenya's HIV epidemic affects most of its general population, but groups of men who have sex with men, women, sex workers and people who inject drugs are still more vulnerable to infection.

Data from pre-test and post-test was analysed using causal comparative and inferential statistics. The findings showed that multimodal therapy was effective in reducing risky sexual behaviour related to HIV and AIDS transmission among MSM community in Kenya.

Theoretical frame work

This study is based on Bandura's Social cognitive Learning Theory, Beck and Rosenstock Health Belief Model (1991) and Lazarus Multimodal Therapy (1998- 2008). which posits that people learn from one another, via observation, imitation, and modeling. The *theory* encompasses attention, memory, and motivation as in virtual contexts. When individuals are sexually aroused, MSM might more automatically activate, retrieve, and integrate relevant skills, knowledge, beliefs, etc., pertaining to safer sex when MSM are in similar real-life risky contexts

The theoretical framework guiding this study is a combination of social, cognitive learning and Behavioural theory (CLTT) of Bandura (1977), health belief model (HBM) by Rosenstock & Becker (1998) and Lazarus Multimodal theory. This theoretical framework indicates a consensus that behaviour is learned and enforced from the environment through observation and modelling. Bandura's social cognitive learning theory conceptualise risk behaviour as developing through stages necessitated by psychosocial-environmental factors.

Masters & Johnson (1989), in their behaviour theories posit that same-sex orientation is a result of learning and consequently, an individual's sexual orientation homosexual or heterosexual can be channelled through different learning experiences. These theoretical perspectives look at risk sexual behaviour as learned in the same way other behaviour is learned and can be unlearned through behavioural change techniques (Simons, Kalichman & Santrock, 2004). The present study is about risky sexual behaviour change among MSM who to prevent HIV and AIDS transmission.

Behavioural Theory

The key proponents of behavioural theory are Pavlov; classical conditioning (1927), Skinner; operant conditioning (1938) and Bandura (1971-1991) who combined classical, operant, and his social learning theory to form social cognition learning theory which later became behaviourism therapy as it is known today (Plotnik, 2009). Bandura later added the self-efficacy theory (1997) which is the belief that one can master a situation and produce positive outcome on the basis of perceived ability.

The behavioural and social learning theories emphasize that environmental experiences and situations influence behaviour patterns that form one's personality.

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This has fostered a scientific climate for understanding personality by highlighting and facilitating the observation of behaviour. It also suggests that people have the ability to control their behaviour and the environment as they deem necessary. The social cognition theory adds value to the theoretical framework in that it underscores both the environmental influences and the cognitions of human mind to explain personality and temperament.

Bandura's Social Learning Theory posits that people learn from one another, via observation, imitation, and modelling. The model of interaction between environment, the person and the behaviour involves the person's thoughts and actions is called reciprocal determinism model. The interaction between the person and the environment involves human beliefs and cognitive competencies that are developed and modified by social influences and structures within the environment. The third interaction, between the environment and behaviour involves a person's behaviour determining the aspects of their environment and in turn their behaviour modified by that environment, (Simons, Kalichman & Santrock, 2004). Bandura's theory also suggests that people have ability to control their environment. The behavioural social cognitive learning perspectives help to explain the nature and development of MSM risky sexual behaviour and also indicate that any learned behaviour can be unlearned as long as the individuals believe they are able to master the behaviour change or self-efficacy (Mcleod, 2007). The findings of the present study will determine if MMT skills training to MSM is an efficacious intervention in HIV and AIDS transmission risk behaviour reduction.

The MMT skills promote individual behaviour change by exploring clients' personality through structural profile and personal life history inventory. The basic assumption of behavioural theories is that people are capable of self-directing their behaviour change (Corey, 2009). This is also the key assumption in multimodal intervention. Therefore any success on MSM risky sexual behaviour change will depend on their belief in ability to change their individual determinants of risky behaviour and core learning experiences. Therapist assumes that the client has learned maladaptive behaviour and that with therapeutic guidance client can modify these behaviours using relevant behavioural techniques. This makes behaviour theory relevant in guiding this study in the effective administration of the MMT skills (Lazarus and Lazarus, 2008).

Behaviour theory emphasizes strict reliance on principles of the scientific method, concepts and procedures to give validity. The theory also stresses "doing" as opposed to mere talking about the problem and gathering insights and therefore useful in behaviour change interventions. In order to help MSM achieve goals in risky sexual behaviour MMT modality skills will begin with assessment based client's life history inventory and structural profile which explore the behaviours, affects, sensations, imagery, cognitions, interpersonal relationship and experiences. This guides the client in deciding the behaviours to change and those to retain after the interaction among the determinants (Masters & Burish, 2007). The latter are shown in figure

Bandura's (1977) social cognitive leaning theory and Rosenstock's health belief model (1974) have much in common since both represent applications of value expectancy theories. In this study, they complement each other since their focus is on the outcome expectancies and /or perceptions of benefits of multimodal intervention on sexual risk behaviour reduction among MSM to prevention HIV and AIDS infection. Both provide potentially effective interventions all directed at behavioural modifications and an approach to perceived self-efficacy that provides an explanation to influences in health related behaviour change as in MSM. Bandura (1986) asserts that human being is not like mindless robots to be controlled mechanically by others in the environment. Rather they think, reason, imagine, plan, expect, dream, interpret, value, choose and compare. When others control, our values and beliefs allow us to resist their control. He believed, and his theories reflect this belief, that humans have the capacity to control themselves; resist self-directed agency to guide their own behaviour and this motivates and inspires the person to take responsibility for their behaviour.

Bandura's social cognitive theory (1989) places social interactions of behaviour in a conceptual framework of its causation, cognitive process and personal behavioural determinants referred to as reciprocal determinism. This gives the MSM capacity to change their risky sexual behaviour. All they need is motivation, inspiration skills and the three elements of social cognitive theory's mechanism. In MMT modality skills, the therapist guides the client in setting goals for the sessions that follow. The goals have to do with behaviour change based on the multimodal BASIC ID modalities. The therapist does not search for hidden causes of the problem but assumes that the client has learned maladaptive behaviour which can be modified through multimodal skills. The therapist instructs and affirms the client to see any improvement as a result of his/her increased skilfulness and not as therapist's role (Corey &Fawcett, 2009).

Empirical data on MMT and behaviour change efficacy have been in force since 1970s when Bandura was developing the social cognitive theory and the reciprocal determinism (Simons, Kalichman, & Santrock, 2004). Studies done in the past have indicated that multimodal therapy interventions can change the way people behave. Bandura (1991) suggested that individuals may be excellent predictors of how well they will master a potentially difficult problem if they have prior learning experiences. Multimodal therapy intervention applies different techniques from different models as needs arise. The kind of technique chosen depends on the client's individual structural profile inventory based on MMT BASIC modality assessment results (Burish & Masters, 2007).

Brauer and Agras (1980) did a study on effects of MMT techniques on hypertension, randomly assigned 29 patients who had elevated blood pressure. They were put into 3 groups and assigned treatments as follows: biomedical prescription only, progressive muscle relaxation and low salt diet only; and combination of the above two with cognitive restructuring. The treatments began with blood pressure being taken at the baseline and a post-examination after ten weeks treatment.

The results indicated that all groups showed decline in blood pressure following treatment. However, the group that had all the three treatments continued to improve steadily long after six months. The risky sexual behaviour development in MSM is in Africa is multifactorial and can be categorised into individual, network, social and community level. The MSM sexual behaviour is not a disorder passé but has been shaped by their social, environmental and biological vulnerabilities. The present study is about the risky sexual behaviour in relation to HIV and AIDS prevention among MSM and this information is relevant in shaping the message.

Sexual behaviour change among MSM often involves the development of alternative behaviour patterns that may predispose them to HIV and AIDS infection. However, in some cases sexual behaviour alternatives may not be feasible forcing the MSM to turn to sources of sexual release which expose them to HIV and AIDS infection (Burish & Masters, 2007). Therefore understanding the behaviour change dynamics in MSM is vital for HIV and AIDS prevention measures. The behaviour change interventions used in multimodal therapy including aversion treatments, biofeedback, self-monitoring and contingency management are designed to promote health and prevent illness. These multimodal behavioural interventions seek to reduce the risk of HIV and AIDS transmission by addressing risky behaviours (IBBS, 2012). Multimodal intervention in this study will aim at reducing the number of unprotected anal intercourse, number of sexual partners, improve treatment seeking and adherence and increase the consistent and correct use of condom.

The global available data show that men who have sex with men bear a heavier burden of HIV and AIDS than other populations. Therefore addressing HIV and AIDS in MSM will require effective combination prevention and treatment approaches to deal with complex issue around HIV and AIDS among MSM. Beyrer, Sulivan &Trapence (2012) did a study that involved 1918 MSM to assess the potential of HIV and AIDS transmission among MSM who engage in high risk activities in 4 cities in USA. The following findings were reported: 59% of the MSM had unprotected anal sex with multiple male partners majority of who were HIV positive. 15.6% of MSM engaged in unprotected intercourse with partners who were HIV-negative or whose status was not known. The conclusion was that an estimated 79.7% new infections were likely to have taken place among those who engaged in sex with the participants. These findings call for intensive prevention available and affordable programs for both infected and not infected persons to stem the spread of the virus.

In Scotland and Holland a carefully controlled outcome study conducted to compare MMT with less integrative approaches in helping children with learning disabilities clearly supported multimodal therapy. The study involved 34 patients suffering from obsessive-compulsive disorders, 90% of who had received prior treatment without success, and 70% of who had suffered from their disorders for more than 4 years. Multimodal intervention was administered for ten weeks after which substantial recoveries of the disorder had reduced by 40% (Janssen and Shepherd, 2010). These findings confirm the relevance of this study that addresses behavioural problems from the source through participants' personality assessment.

Methodology

This study adopted a quasi-experimental (pre-test, post-test non-equivalent control group design) in assessing the efficacy of multimodal intervention skills in HIV and AIDS prevention among men who have sex with MSM in Nairobi Kenya. According to (Creswell, 2009; & Leedy, 2006) the non-equivalent control group is a control group that appears similar to the experimental group but differs significantly in terms of the variables related to the group and provides controls for all major classes of potential confounds except the ones due to interactions of selection, maturation, history, instrumentation and statistical regression differentials.

The Non-equivalent control group also provides comparative data to the treatment group.

Babbie (2010) and Campbell (2003) further clarified that a quasi-experimental design is an experimental study in which the experimental and the control groups are not fully randomized during assignment however where possible randomization should be attempted for purposes of validity. In this study systematic random sampling was done as way of methodological innovation since the study population was large enough to accommodate randomization. The non-equivalent (pre-test and post-test) control group design in this study where the experimental group A and control group B were systematically randomized, both groups were administered pre-test and post-test but only the experimental group received the treatment.

The assignment of experimental and control groups in this study was done through systematic sampling of the sites in order to prevent data contamination or herding effects since the study site and population were both in Nairobi but different parts of the county far from each other. The study applied quantitative methods to assess the impact of MMT modalities skills on HIV risky sexual behaviour reduction among MSM. These explored the MSM's BASIC ID modalities including personality components including behaviour both overt and covert, affects, sensation, imagery, cognition, interpersonal relationships. These skills empower MSM with self-awareness skill in sexual decision making, impulse control, assertiveness and persuasive skills in sexual matters particularly protected anal sex through consistent condom use and multiple sexual partners' avoidance and prompt treatment seeking. The MMT modality skills have been proven to be effective in addressing MSM sexual risky behaviour.

Findings

This study investigated the efficacy of multimodal therapy skills in HIV and AIDS prevention through risky sexual behavior reduction among MSM in Nairobi, Kenya. Three assessments were administered to both experimental and control groups in order to establish behavior changes between and within the study groups. The intervention was given to the experimental group for 10 weeks. This chapter is a presentation of detailed description of the results obtained after data analysis and its interpretation based on the research findings. The presentation was done in tables, graphs and narratives guided by the research objectives and questions.

Over all, a significant difference in mean HIV risky sexual behavior acts demonstrated in increase in consistent condom use and reduction in the number of multiple sexual partners.

A total of 188 participants were randomly selected from two MSM community run centers in Nairobi. The response rate was 100% mainly because the researcher was personally involved in the selection which was done in the two community centers so there was no loss to follow-up on. This was an excellent response rate since Mugenda and Mugenda (20003), a response rate of 70% and above is very good.

The participants were enrolled in two study groups, namely the experimental (n=94) and the control (n=94) through tossing a coin. Hoymas in Pangani randomized to experimental group while Ishtar in South B picked the Control group. Data was collected using self- administered questionnaire which was adapted from global standard behavioral assessment tool for HIV and AIDS behavioral Surveillance Survey that was obtained from fhi_360 Kenya, office.

All the 188 participants participated in the study where three assessments were done; one at the beginning (pre-test),

one after the 10 weeks intervention (post-test) and a follow up one that was given 30 days after the intervention. All the three assessments covered HIV transmission risk exposure information, marriage and partnerships, sexual history (numbers and types of partners), condom use (both male and female) knowledge of STIs, opinions, knowledge and attitudes towards HIV/AIDS sexual risky behavior. The three assessments administered aimed at determining the efficacy and sustainability of Multimodal therapy through two key outcome measures of HIV and AIDS risky sexual behavior; namely consistent condom use and multiple sex partners' reduction.

This took place in both Hoymas MSM center in Pangani. The pre-test was done by both groups after both experimental and control groups were explained the purpose of the study, objectives, ethical implications and participants signing the consent. Immediately after this the experimental group was started on the intervention which took ten weeks. at four hours a week. Immediately after the Intervention, the (post-test) assessment was administered by the researcher to both experimental and control groups in their centers the same day.

After the post-test, the researcher taught the multimodal therapy skills to Ishtar community for two days from 9 am to 4 pm.

These results above showed that the control and the experimental groups were the same with respect to key socio-demographic characteristics.

From this data, the socio-demographic characteristics of the participants mainly, education, religion, marriage, age in years and at sexual orientation discovery were evenly distributed.

The difference in difference (DiD) was used to estimate the impact of the MMT intervention in increasing consistent condom use among MSM in Nairobi, Kenya. The DiD is used to estimate treatment effects comparing the pre and post-treatment differences in outcome of two groups. The Did estimator equals the average change in outcomes in one group, after the average change in the two condom use scores outcome in the second group is subtracted. In this study the reductions were large (p=0.003) demonstrating the MMT effectiveness in increasing consistent condom use which translates into reduction in unprotected anal sex among the study participants. This data shows that the intervention was efficacious in reducing unprotected anal sex by causing an increase in consistent condom use to reduce risky sexual acts among the MSM. Those with secondary school level of education were 55 (58.5%) in experimental group and were Christians (84 (89.3%).

The first objective was to assess the effectiveness of the Multimodal BASIC ID modality skills on HIV and AIDS prevention through risky sexual behavior reduction among MSM in Nairobi County Kenya.

To achieve this objective, the MSM participants were asked to respond to several statements intended to describe their sexual risky behavior history in terms of their consistent condom use and multiple anal sexual partners. The rating response was "Yes" or "No" to condom use and the "number" and "types" of their sexual partners. Data on this objective was analyzed under the hypothesis 'there is no significant difference in HIV and AIDS transmission risk behavior reduction among MSM who have undergone MMT BASIC ID skills and those who have not.

Consistent Condom Use

Table 2. The mean estimates of consistent condom use for the control and experimental groups.

Grouping	Time	Mean	Std. deviation	*p*-value
Control (n=94)	Time 0	0.4574	0.50086	$p = 0.754$
	Time 1	0.4362	0.49857	
Experimental (n=94)	Time 0	0.4362	0.49857	$p < 0.0001$
	Time 1	0.7128	0.45490	

Time 0- Stands for the pre-test; and Time 1 stands for the post-test.

Consistent condom use was defined in terms of correct and consistent use of condom for all sexual acts with every partner whether commercial, non -commercial partners, anal or oral sex.

Table 2 shows the summarized mean estimates of consistent condom use.

Table 1. Socio-demographic characteristics by study groups at (pretest).

Characteristics	Control group	Experimental group	χ^2 statistics	p-value*
Number of participants	94	94	-	-
Education level				
Primary school	8 (8.51%)	5 (5.31%)	1.662	0.436
Secondary school	47 (50%)	55 (58.5%)		
Higher/College education	39 (41.5%)	34 (36.2%)		
Religion			2.913	0.405
Christian	84 (89.3%)	81 (86.2%)		
Muslim	8 (8.51%)	9 (9.6%)		
None	1 (1.0%)	4 (4.3%)		
Others	1 (1.0%)	0 (0.0%)		
Ever married to a woman				
Yes	20	20	2.000	1.000
No	73	74		
Currently married				
Yes	10	13	1.416	0.493
No	84	81		

**p*-values generated using Pearson's χ^2 tests for independence

	Control				Experimental			
	Mean	Lower Bound	Upper Bound	Std. Deviation	Mean	Lower Bound	Upper Bound	Std. Deviation
Age in years	26.20 years	25.09	27.31	5.415	25.33	24.23	26.44	5.366
Age at discovery of orientation	16.12 years	15.34	16.89	3.798	15.27	14.34	16.20	4.537

At the pretest both groups were very close on condom use approximately 40% levels for both experimental and control groups respectively. However based on group mean estimates there was a statistically significant difference between pre-test and post-test data on consistent condom use in the experimental group (P<0.0001) while there was no significant difference in the control group (P=0.754). This demonstrated that the intervention led to an increase in consistent condom use among experimental group and this depicted that the intervention was efficacious at post-treatment in the experimental group (p<0.0001).

Similarly the profile plot (Figure1) was done and graphically demonstrated the impact of the Multimodal therapy intervention on the consistent condom use over the 10 weeks treatment periods across the control and experimental groups. The line graphs show a steep increase in the consistent condom use amongst the experimental group while there was a drop in the consistent condom use amongst the control group. This depicted the intervention was efficacious in increasing consistent condom use and reduction in multiple sexual partners as seen at post-treatment in the experimental group (Figure 1).

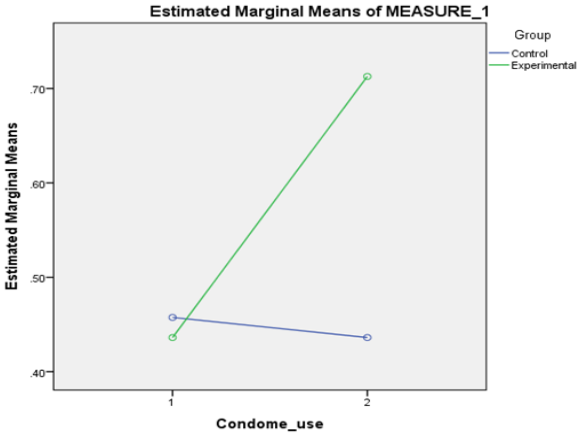

Figure 1.

The line graph shows a steep increase in consistent condom use among experimental group while there was a drop in the consistent condom use among the control group (Figure 1). This depicted that the intervention was effective in reducing the risk of HIV infection through consistent condom use among the experimental group. The profile plot showing the trend in measurements for the condom use over time for mean proportion of consistent condom use at pre-test and post- test for the two groups showed relatively constant trend over the study period 0.4574 (SD: 0.50086) to a mean of 0.4362 (SD: 0.49857) among the control group (p=0.754)

In the experimental groups the mean consistent condom use increased from a pre-test of 0.4362 (SD: 049857) to a mean of 0.7128 (SD: 045490) Table 3

Table 3. Descriptive analysis of consistent condom use at pre-test and post-test among the control and experimental groups.

	Grouping	Mean	Std. Deviation	N
Condom use – Pre-test	Control	0.4574	0.50086	94
	Experimental	0.4362	0.49857	94
	Total	0.4468	0.49849	188
Condom use – Post-test	Control	0.4362	0.49857	94
	Experimental	0.7128	0.45490	94
	Total	0.5745	0.49574	188

Difference in differences (DiD) is a tool to estimate treatment effects comparing the pre- and post-treatment differences in the outcome of two groups. In this study, difference-in-differences (DiD) analysis is used to estimate the impact of the interventions in reducing consistent condom use amongst MSM in Nairobi, Kenya.

The DiD estimator equals the average change in outcomes in one group, after the average change in suicidal scores outcome in the second group is subtracted. The difference-in-differences approach to isolating program effect rests upon the usual assumptions of Ordinary Least Squares (OLS). The internal validity rests upon the premise that changes in consistent condom use over time in one group are equivalent to the changes in consistent condom uses that would have been observed in the second group, had the interventions not been implemented.

The DiD estimators are reported using the OLS estimator and it shows an increase in consistent condom use over the two-time period in the two groups depicting increase in consistent condom use. These reductions are statistically significant (p=0.003). This shows that the intervention was effective in increasing frequency of condom use and reducing unprotected sex with multiple partners. However, although it is reasonable to expect the experimental group to show a decrease in unprotected sex and vice versa, with control, it is possible to have bias reporting and community setting data collection to have mitigated on this particular result.

It is evident the Multimodal therapy intervention is efficacious in reducing risky sexual behaviors related to HIV and AIDS among MSM in Nairobi Kenya.

Table 4. Difference-in-Differences Estimates of control and experimental groups in increasing consistent condom use among MSM in Nairobi , Kenya.

	**(1) Difference-in Differences Estimates (Group*Post-treatment)
Pre-test- Post-test	0.494 (p = 0.003)

** (1) The DiD estimator is the interaction between treatment arms and post-treatment scores and these were determined using OLS method.

Effect sizes

The study revealed a constant proportion of consistent condom use among the controls with a pre-test of 0.4574 (SD: 0.50068) and post-test of 0.4362 (SD: 0.49857) while experimental group revealed an increase in consistent condom use from 0.4362 (SD: 0.49857) to 0.7128 (SD: 0.45490) at post-treatment as shown on table 5. This shows that the intervention had a large effect in increasing consistent condom use among the experimental group from as opposed to the control group.

Table 5. Consistent condom use proportions at pre-treatment and post-treatment at 10 weeks for control and experimental groups amongst MSM in Nairobi County, Kenya.

	Mean scores (SD)	
	Pre-treatment	Post - treatment/6 months
Control (n=94)	0.4574 (0.50086)	0.4362 (0.49857)
Experimental (n=94)	0.4362 (0.49857)	0.7128 (0.45490)

Sample paired T-test was used to determine the statistical significance in the paired mean difference scores between baseline and post-treatment. With regard to the control group, the study revealed mean difference scores between baseline and treatment of 0.02128 (SD $\pm$ 0.65548) and this was not statistically significant (p=0.754). With respect to experimental group, the study showed mean difference scores between baseline and post-treatment of [0.27660 (SD $\pm$ 0.66242)] and this was statistically significant

(p < 0.0001). This means that the intervention was efficacious on increasing consistent condom use in the experimental group as opposed to the control group.

Cohen's *d* effect sizes for condom use were calculated as: (mean at baseline – mean at end-line (post-test) of treatment difference scores with corresponding (95%) confidence intervals calculated. Effect sizes were computed and showed statistically significant effect size. The Cohen's d effect size value for condom use was (d= -0.390; 95% CI: -0.483 – -0.296) which was a large effect size (Table 6). This shows that the intervention had an effect on the increase of consistent condom use.

Table 6. Effect sizes for condom use from pre-treatment to post-treatment at 10 weeks follow-up for control and experimental group.

	Pre/10 Wks-post-treatment (n=94)	
	Effect sizes	95% CI
Condom use	-0.390	-0.483 – -0.296

Table 7. Paired sample test: Mean outcome difference consistent condom use scores from pre-treatment to post-treatment at 10 weeks after the intervention for both control and experimental groups.

Difference in Differences	Mean difference scores (SD)	p-value
Control (n=94)	0.02128 (0.65548)	*p* =0.754
Experimental (n=94)	0.27660 (0.66242)	*p*<0.0001

Difference in differences (DiD) is a tool to estimate treatment effects comparing the pre- and post-treatment differences in the outcome of two groups. In this study, difference-in-differences (DiD) analysis is used to estimate the impact of the intervention in increasing the consistent condom use among MSM in Nairobi, Kenya. The DiD estimator equals the average change in outcomes in one group, after the average change in unprotected sex scores outcome in the second group is subtracted.

The difference-in-differences approach to isolating program effect rests upon the usual assumptions of Ordinary Least Squares (OLS). The internal validity rests upon the premise that changes in consistent condom use over time in one group are equivalent to the changes in consistent condom uses that would have been observed in the second group, had the interventions not been implemented. The DiD estimators are reported using the OLS estimator and it shows an increase in consistent condom use over the two-time period in the two groups depicting increase in consistent condom use. These increase are statistically significant (p=0.003).

Table 8. Difference-in-Differences Estimates of control and experimental groups in increasing consistent condom use amongst MSM in Nairobi County, Kenya.

	**(1) Difference-in Differences Estimates (Group*Post-test)
Pre-test - Post-test	0.494 (p = 0.003)

**(1) The DID estimator is the interaction between treatment arms and post-treatment scores and these were determined using OLS method.

In this study D1D estimator shows an increase in constituent condom use over the two time period in the experimental group. (P=0.003).

The effect sizes in this study showed consistent proportion of consistent condom use among experimental group from [(0.4362 (SD: 49857) to (0.7128 (SD: 045490)] at post treatment as shown in (Table 9).

Regarding sample paired T-test in the paired mean difference scores the experimental group showed mean difference scores between baseline (pretest) and post treatment test of 0.27660 [(SD+066242) P<0.0001]. This means that the intervention had an effect on increasing consistent condom use in the experimental group (P<0.0001.)

Table 9. Consistent condom use proportions at pre-treatment and post-treatment at 10 weeks for control and experimental groups amongst MSM in Nairobi County, Kenya.

	Mean scores (SD)	
	Pre-treatment	Post - treatment/10 weeks
Control (n=94)	0.4574 (0.50086)	0.4362 (0.49857)
Experimental (n=94)	0.4362 (0.49857)	0.7128 (0.45490)

Sample paired T-test was used to determine the statistical significance in the paired mean difference scores between baseline and post-treatment. With regard to the control group, the study revealed mean difference scores between baseline and treatment of 0.02128 (SD $\pm$ 0.65548) and this was not statistically significant (*p*=0.754). With respect to experimental group, the study showed mean difference scores between baseline and post-treatment of 0.27660 (SD $\pm$ 0.66242) and this was statistically significant (p < 0.0001). This means that the interventions had an effect on increasing consistent condom use in the experimental group as opposed to the control group (Table 10).

Table 10. Paired sample test: Mean outcome difference consistent condom use scores from pre-test to post-test at 10 weeks follow-up for control and experimental groups.

	Mean difference scores (SD)	p-value
Control (n=94)	0.02128 (0.65548)	*p* =0.754
Experimental (n=94)	0.27660 (0.66242)	*p* < 0.0001

Cohen's *d* effect sizes for condom use were calculated as: (mean at baseline – mean at post-test)/SD of treatment difference scores (Morris and DeShon, 2002) with corresponding 95% confidence intervals calculated. Effect sizes were computed and showed statistically significant effect size (Table 3). The Cohen's d effect size value for condom use was d= -0.390; 95% CI: -0.483 – -0.296 which was a large effect size. This shows that the intervention had an effect on the increase of condom use.

Table 11. Effect sizes for condom use from pre-test to post-test at 10 weeks follow-up for control and experimental group.

	Pre/10 Wks-post-treatment (n=94)	
	Effect sizes	95% CI
Condom use	-0.390	-0.483 – -0.296

Avoiding sexual activity with Multiple Partners

Multiple sexual partners was defined as the numbers and types partners one has sex with, whether male or female, commercial, non-commercial or other non-regular partners in the past one month. The greater the number of sexual partners one has, the more likely it to get infected with HIV and AIDS virus.

Table 12. Shows the mean estimates of sexual partners for the control and experimental groups.

Grouping	Time	Mean	Std. deviation	p-value
Control (n=94)	Pre-test	2.71	2.924	*P*=0.861
	Post-test	5.09	3.528	
Experimental (n=94)	Pre-test	2.97	2.499	*P*<0.001
	Post-test	2.89	3.036	

Sexual partners group mean estimates showed that there was a large noticeable difference between the pre-test and the

post-test in sexual partners in the experimental group (P<0.0001) and in the control group (P=0.861).

This demonstrated that the multimodal therapy skills had a large effect in reducing the number of sexual partners as shown in (Table. 12)

Figure 2. The Profile plot showing the trend in measurements for the control and experimental groups over time is shown in figure 2.

The profile plot was done and demonstrated the impact of the interventions on the mean number of sexual partners over the post-treatment periods across the control and experimental groups. The line graphs show a steep increase in number of sexual partners in the control group while the experimental group remained relatively the same.

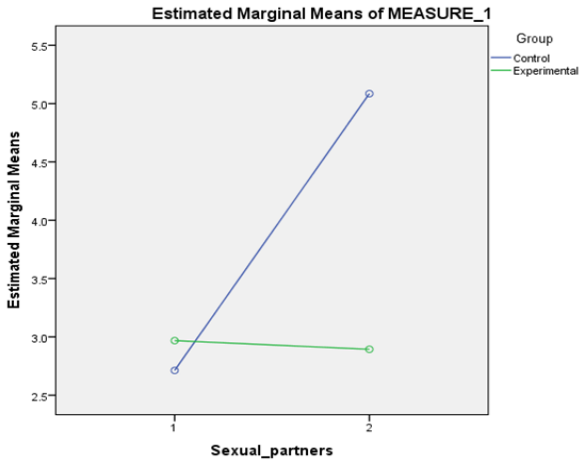

Figure 2.

The line graphs show a steep increase in number of sexual partners in the control group while the experimental group had a significant decline in sexual partners. This demonstrated the efficacy of the multimodal therapy skills intervention in reducing sexual partners. Mean number of sexual partners at Pretest and post-test treatments showed a steady rise in the mean number of sexual partners in the control group, from 2.71 (SD: 2.924) to mean of 5.09 (SD: 3.528) while experimental group had a relatively significant decline with a mean of 2.97 (SD: 2.499) at pre-test and mean of 2.89 (SD: 3.036) at post treatment group (Table 9).

Table 13. Descriptive analysis of the number of sexual partners at baseline and post-treatment among the control and experimental groups.

	Grouping	Mean	Std. Deviation	N
Sexual partners – Pre-test	Control	2.71	2.924	94
	Experimental	2.97	2.499	94
	Total	2.84	2.716	188
Sexual partners – Post-test	Control	5.09	3.528	94
	Experimental	2.79	2.936	94
	Total	3.99	3.461	188

In this study the DiD shows a declining trend in sexual partners over the two-time period in the two groups depicting a decrease in the number of sexual partners. This is statistically significant (p < 0.0001). This demonstrates the efficacy of Multimodal intervention in reducing multiple sexual partners and thereby reducing risky sex behavior which translates into reduced HIV and AIDS infections from risky behavior.

Sample paired T-test was used to determine the statistical significance in the paired mean difference scores between baseline and post-test treatment. With regard to the control group, the study revealed mean difference scores between baseline and treatment of [-2.372 (SD=3.239) (P=0.861) and this was not statistically significant.

With respect to the experimental group, the study showed mean difference scores between baseline and post treatment of [0.074 (SD±4.104)]. This was statistically significant (P<0.001), showing the intervention had an effect on reducing the number of sexual partners.

Table 14. Sexual partners mean scores at pre-treatment and post-treatment at 10 weeks for control and experimental groups.

	Mean scores (SD)	
	Pre-test	**Post - test/10 weeks**
Control (n=94)	2.71 (2.924)	5.09 (3.528)
Experimental (n=94)	2.97 (2.499)	2.89 (3.036)

Cohen's d effect size was calculated as: (mean at baseline – mean at post-test): ISD of treatment difference scores (Morris and Dishon, 2002) with corresponding 95% confidence intervals calculated. Effect was compared and these showed statistically significant effect size (Table, 12). The Cohen's d effect size value for sexual partners was (d=0.665:95% C1-0.191—0.140) which was a large effect size. This shows that the intervention had an effect on the decrease of the number of sexual partners P<0.0001 in the experimental group while the control group showed an increase in the number of sexual partners. (P=0.861)

The Cohen's d effect size value for sexual partners was (d= -0.665; 95% CI: -0.191 – -0.140) which was a large effect size. This showed that the intervention was efficacious on the decrease of sexual partners.

Table 15. Effect sizes for sexual partners from treatment to post treatment at 10 weeks.

	Pre/10 week post-treatment (n=94)	
	Effect sizes	95% CI
Sexual partners	-0.665	-0.191 – -0.140

Appendix

Table 1. Univariate analysis for socio-demographic characteristics as predictors of HIV and AIDS risky sexual behavior among MSM in Nairobi, Kenya.

Variable	N (%)
Age in years	
<25 years	92/188 (48.7%)
25 – 35 years	85/188 (45.0%)
>35 years	12/188 (6.3%)
Religion	
Christian	166/188(87.8%)
Muslim	17 (9.0%)
Others	6 (3.1%)
Education	
Primary	13/188 (6.9%)
Secondary	103/188(54.5%)
Higher education/college	73 (38.6%)
Having ever been married to a woman.	51/188 (27.0%)
Currently married and living with a female sexual partner.	37 (19.6%)
Consistently using condoms.	75/188(39.7%)

Table 2. Difference-in-Differences (DiD) Estimates of control and experimental groups among MSM in Nairobi county, Kenya.

	**(1) Difference-in Differences Estimates (Group*Post-treatment)
Pretest - Post-treatment	- 0.643 ($p < 0.0001$).

Table 3. Univariate analysis of demographic characteristics amongst the MSM.

	Range	Mean	Std Deviation	Variance
Year of birth	1966 – 1999	1990.96	5.612	31.493
Age in years	18 – 49	25.71	5.392	29.078
Age at discovery on orientation	2 – 30	15.77	4.099	16.804
Number of sexual partners in the last one month	0 -15	2.95	2.538	6.442

Table 4. Bivariable analysis for socio- demographic characteristics and consistent condom use among MSM.

Variable	Use of condoms consistently		Pearsons-chi-square test	p-value
Age in years	No	Yes		
<25 years	56/92 (60.9%)	36/92 (39.1%)	0.572	0.751
25 – 35 years	52/85 (61.2%	33/85 (38.8%)		
>35 years	6/12 (50.0%)	6/12 (50.0%)		
Religion				
Christian	98/166 (59.0%)	68/166 (41.0%)	4.077	0.130
Muslim	10/17 (58.8%)	7/17 (41.2%)		
Others	6/6 (100.0%)	0/6 (0.0%)		
Education				
Primary	6/13 (46.2%)	7/13 (53.8%)	2.899	0.235
Secondary	59/103 (57.3%)	44/103 (42.7%)		
Higher education/college	49/73 (67.1%)	24/73 (32.9%)		
You have ever been married to a woman				
No	86/138 (62.3%)	52/138 (37.7%)	0.856	0.05*
Yes	28/51 (54.9%)	23/51 (45.1%)		
You are currently married/living with a female sexual partner				
No	95/152 (62.5%)	57/152 (37.5%)	1.545	0.020*
	19/37 (51.4%)	18/37 (48.6%)		

Table 5. presents bivariate analysis of psychosocial characteristics and consistent condom use among MSM.

Variable	No consistent condom use	Consistent condom use	Chi-square test	p-value
Personal HIV risky behaviour change starts with you				
No	17/26 (65.4%)	9/26 (34.6%)	0.323	0.050*
Yes	97/163 (59.5%)	66/163 (40.5%)		
Removing sexual arousal trigger behaviours is helps lowers risk acts				
No	17/26 (65.4%)	9/26 (34.6%)		0.570
Yes	97/163 (59.5%)	66/163 (40.5%)		0.015*
Modifying sensuous settings (changing environment) prevent risk acts				
No	34/57 (59.6%)	23/57 (40.4%)	0.323	0.902
Yes	80/132 (60.6%)	52/132 (39.4%)		

Narrowing relationships that expose one to HIV minimizes risk acts				
No	18/33 (54.5%)	15/33 (45.5%)	0.556	0457
Yes	96/156 (61.5%)	60/156 (38.5%)		0.0450
Getting an accountable partner for reinforcement reduces risk acts				
No	25/47 (53.2%)	22/47 (46.8%)	1.327	0323
Yes	89/142 (62.7%)	53/142 (37.3%)		0.0302
Exercise impulse control will prevent risk acts				
No	22/37 (59.5%)	15/37 (40.5%)	0.014	0.905
Yes	92/152 (60.5%)	60/152 (39.5%)		0.0143
Have often had alcoholic drinks during the last 4 weeks				
Very often	21/34 (61.8%)	13/34 (38.2%)	3.289	0.511
A good deal	26/41 (63.4%)	15/41 (36.6%)		
Not much	36/62 (58.1%)	26/62 (41.9%)		
Not at all	27/48 (56.2%)	21/48 (43.8%)		
Don't know	4/4 (100.0%)	0/4 (0.0%)		
Have tried various types of drugs.				
Alcohol & cigarettes	35/51 (68.6%)	16/51 (31.4%)	2.210	0.530
Alcohol only	44/77 (57.1%)	33/77 (42.9%)		
Not at all	26/44 (59.1%)	18/44 (40.9%)		
Others	9/17 (52.9%)	8/17 (47.1%)		
You have tried to modify your sexual behavior since knowing your status.				
No	32/46 (69.6%)	14/46 (30.4%)	2.172	0.413
Yes	82/143 (57.3%)	61/143 (42.7%)		0.0141*
Have injected drugs in the last one month				
No	101/165 (61.2%)	64/165 (38.8%)	0.435	0.510
Yes	13/24 (54.2%)	11/24 (45.8%)		
The likelihood of transmitting or getting infected with HIV compared to other MSM				
Very likely	36/64 (56.2%)	28/64 (43.8%)	2.080	0.721
Somehow likely	29/49 (59.2%)	20/49 (40.8%)		
Likely	19/27 (70.4%)	8/27 (29.6%)		
Not likely	16/28 (57.1%)	12/28 (42.9%)		
Don't know	14/21 (66.7%)	7/21 (33.3%)		
Have you done my best to reduce chances of transmitting or getting infected with HIV				
No	15/16 (93.8%)	1/16 (6.2%)	8.163	0.004*
Yes	99/173 (57.2%)	74/173 (42.8%)		
Rated your perceived greatest barriers to HIV risk behavior change				
Sexual impulse and/or MSM Social affiliation	56/88 (63.6%)	32/88 (36.4%	9.656	0.022*
HAART availability &/ or peer group acceptance	18/42 (42.9%)	24/42 (57.1%)		
All of the above	26/34 (76.5%)	8/34 (23.5%)		
Don't know	14/25 (56.0%)	11/25 (44.0%)		
In the past one month you have had sexual contact with another man. Indicate.				
Oral sex & Others	15/27 (55.6%)	12/27 (44.4%)	5.727	0.220
Anal sex only	39/67 (58.2%)	28/67 (41.8%)		
Anal sex & Others	13/23 (56.5%)	10/23 (43.5%)		
You touched the penis… &/or another man touched your penis	14/28 (50.0%)	14/28 (50.0%)		
All of the above	33/44 (75.0%)	11/44 (25.0%)		
In the past one month you had oral sex with a man, where a man put his penis in your mouth and you put yours in his mouth.				
No	61/95 (64.2%)	34/95 (35.8%)	1.209	0.027*
Yes	53/94 (56.4%)	41/94 (43.6%)		
You or your partner often used condom during the last one month.				
Very often	43/91 (47.3%)	48/91 (52.7%)	19.846	0.001*
A good deal	28/47 (59.6%)	19/47 (40.4%)		
Not much	27/34 (79.4%)	7/34 (20.6%)		
Not at all	13/14 (92.9%)	1/14 (7.1%)		
Don't know	3/3 (100.0%)	0/3 (0.0%)		
You ejaculated in another man's mouth or you partner ejaculated in your mouth.				
No	85/143 (59.4%)	58/143 (40.6%)	0.189	0.664
Yes	29/46 (63.0%)	17/46 (37.0%)		
You had anal sex with a commercial partner in the last one month.				
No	57/88 (64.8%)	31/88 (35.2%)	1.366	0.243
Yes	57/101 (56.4%)	44/101 (43.6%)		
You have ever discussed HIV/AIDS/STDs with any of your commercial sex partners.				
No	47/61 (77.0%)	14/61 (23.0%)	10.535	0.001*

Yes	67/128 (52.3%)	61/128 (47.7%)		
You had anal sex with other partners in the last one month				
No	28/45 (62.2%)	17/45 (7.8%)	0.090	0.765
Yes	86/144 (59.7%)	58/144 (40.3%)		
You have ever discussed HIV/AIDS/STDS with your non-paying partners				
No	28/37 (75.7%)	9/37 (24.3%)	4.534	0.003*
Yes	86/152 (56.6%)	66/152 (43.4%)		
You have ever had sexual intercourses with women.				
No	45/68 (66.2%)	23/68 (33.8%)	1.523	0.278
Yes	69/121 (57.0%)	52/121 (43.0%)		
You have ever used a lubricant.				
No	8/11 (72.7%)	3/11 (27.3%)	0.751	0.386
Yes	106/178 (59.6%)	72/178 (40.4%)		
You have had diseases that can be transmitted through sexual intercourse.				
No	28/43 (65.1%)	15/43 (34.9%)	0.536	0.464
Yes	86/146 (58.9%)	60/146 (41.1%)		
You have had a genital discharge in the last 2 months.				
No	98/153 (64.1%)	55/153 (35.9%)	4.681	0.003*
Yes	16/36 (44.4%)	20/36 (55.6%)		
You have had an anal ulcer or sore during the last 2 months.				
No	94/155 (60.6%)	61/155 (39.4%)	0.039	0.844
Yes	20/34 (58.8%)	14/34 (41.2%)		
You have had anal discharge in the last 2 months.				
No	106/168 (63.1%)	62/168 (36.9%)	4.874	0.027*
Yes	8/21 (38.1%)	1321 (61.9%)		
Most MSM I meet only engage in safer sex practices.				
No	50/73 (68.5%)	23/73 (31.5%)	3.321	0.068
Yes	64/116 (55.2%)	52/116 (44.8%)		
I have trouble letting a sex partner know that I want to have safer sex only				
No	79/119 (66.4%)	40/119 (33.6%)	4.944	0.026*
Yes	35/70 (50.0%)	35/70 (50.0%)		
I can choose safer sex with a man I have sex with regularly				
No	13/20 (65.0%)	7/20 (35.0%)	0.205	0.651
Yes	101/169 (59.8%)	68/169 (40.2%)		
I am able to avoid behaviour that may put me at a risk of HIV infection				
No	12/15 (80.0%)	3/15 (20.0%)	2.637	0.104
Yes	102/174 (58.6%)	72/174 (41.4%)		
I find it hard to have sex with a man I have strong sexual feelings for				
No	68/115 (59.1%)	47/115 (40.9%)	0.173	0.678
Yes	46/74 (62.2%)	28/74 (37.8%)		
I find it difficult to have safer sex when high or drunk				
No	53/85 (62.4%)	32/85 (37.6%)	0.267	0.605
Yes	61/104 (58.7%)	43/104 (41.3%)		
I am less concerned about having anal sex without a condom now that new anti HIV combination treatments are available				
No	83/137 (60.6%)	54/137 (39.4%)	0.015	0.903
Yes	31/52 (59.6%)	21/52 (40.4%)		
Someone can talk me out of safer sex by persuading me they are HIV negative				
No	84/139 (60.4%)	55/139 (39.6%)	0.003	0.957
Yes	30/50 (60.0%)	20/50 (40.0%)		
If ever I did something risky, I am confident that I would go back to having safer sex right away				
No	28/41 (68.3%)	13/41 (31.7%)	1.391	0.238
Yes	86/148 (58.1%)	62/148 (41.9%)		
I can avoid situations that I consider sexually risky				
No	12/14 (85.7%)	2/14 (14.3%)	4.074	0.044*
Yes	102/175 (58.3%)	73/175 (41.7%)		
I am confident that I can have safer sex even if my partner does not want				
No	16/30 (53.3%)	14/30 (46.7%)	0.727	0.394
Yes	98/159 (61.6%)	61/159 (38.4%)		
I can choose safer sex with a man I have never had sex with before				
No	16/25 (64.0%)	9/25 (36.0%)	0.163	0.827
Yes	98/164 (59.8%)	66/164 (40.2%)		
I find it difficult telling a sex partner not to do something I think is risky				
No	22/32 (68.8%)	10/32 (31.2%)	1.144	0.285
Yes	92/157 (58.6%)	65/157 (41.4%)		
My friends use condoms I feel confident that I will never slip from safer sex				

No	26/39 (66.7%)	13/39 (33.3%)	0.828	0.363
Yes	88/150 (58.7%)	62/150 (41.3%)		
(I don't want to know the result, but have you ever had a HIV test?) You have ever had a HIV test				
No	10/12 (83.3%)	2/12 (16.7%)	2.836	0.092
Yes	104/177 (58.8%)	73/177 (41.2%)		
Physical sensations, touching kissing, strong smell trigger Sex urge, tension, palpitation, masturbation urges, sexual disturbances				
Highly risky	39/66 (59.1%)	27/66 (40.9%)	0.318	0.853
Risky	41/65 (63.1%)	24/65 (36.9%)		
A little risky	34/58 (58.6%)	24/58 (41.4%)		
Images Pictures of being in a gay intimate session, fantasies Being rejected having anal sex with a man, pleasant & unpleasant sexual images.				
Highly risky	48/74 (64.9%)	26/74 (35.1%)	2.931	0.231
Risky	24/48 (50.0%)	24/48 (50.0%)		
A little risky	42/67 (62.7%)	25/67 (37.3%)		
Cognition/Thoughts. Sensitive, deviant unattractive, moral reject, unlovable, My life is controlled by outside forces				
Highly risky	44/64 (68.8%)	20/64 (31.2%)	2.875	0.238
Risky	28/50 (56.0%)	22/50 (44.0%)		
A little risky	42/75 (56.0%)	33/75 (44.0%)		
Interpersonal relationship strain. Lonely, attention seeking in men meeting joints, selective in friendships. Presence of a woman and so only close to men.				
Highly risky	51/78 (65.4%)	27/78 (34.6%)	1.591	0.0451
Risky	26/44 (59.1%)	18/44 (40.9%)		
A little risky	37/67 (55.2%)	30/67 (44.8%)		

Table 6. Logistic regression analysis showing the psychosocial characteristics and consistent condom use and multiple sex partners among MSM.

Variable			**Chi-square**	**p-value**	**OR;95% CI**	**p-value**
You have done your best to reduce chances of transmitting or getting infected with HIV.	Exper	Cont				
No	15/16 (93.8%)	1/16 (6.2%)	8.163	0.004	1.00.	
Yes	99/173 (57.2%)	74/173 (42.8%)			0.089; 95% CI: 0.012 – 0.690	0.021*
Rate your perceived greatest barriers to HIV risk behaviour change						
Sexual impulse and/or MSM Social affiliation	56/88 (63.6%)	32/88 (36.4%	9.656	0.022	0.727; 95% CI: 0.295 – 1.1791	0.489
HAART availability &/ or peer group acceptance	18/42 (42.9%)	24/42 (57.1%)			1.697; 95% CI: 0.625 – 4.606	0.299
All of the above	26/34 (76.5%)	8/34 (23.5%)			0.392; 95% CI: 0.128 – 1.199	0.0100*
Don't know	14/25 (56.0%)	11/25 (44.0%)			1.0	
During the last month you or your partner often used condom.						
Very often	27/34 (79.4%)	7/34 (20.6%)	19.846	0.001	0.069; 95% CI: 0.009-0.549	0.012*
A good deal	13/14 (92.9%)	1/14 (7.1.%)			0.232; 95% CI: 0.092 – 0.587.	0. 020*
Not much	27/34 (79.4%)	7/34 (20.6%)			0.608;-95%CI: 0.298 – 1.240	0.171
Not at all	13/14 (92.9%)	1/14 (7.1%)			000; n/a	0.999
Don't know	3/3 (100.0%)	0/3 (0.0%)			1.0	
You have discussed with your partners how to reduce chances of transmitting or being infected with HIV.						
No	47/61 (77.0%)	14/61 (23.0%)	10.535	0.001	1.0	
Yes	67/128 (52.3%)	61/128 (47.7%)			0.327; 95% CI: 0.164 – 0.652	0.002
You have ever discussed HIV/AIDS or STDs with some of your non-paying partners.						
No	28/37 (75.7%)	9/37 (24.3%)	4.534	0.033	1.0	
Yes	86/152	66/152			0.419; 95% CI:	0.037*

	(56.6%)	(43.4%)			0.185 – 0.948	
You had a genital discharge during the past one months						
No	98/153 (64.1%)	55/153 (35.9%)	4.681	0.030	1.0	
Yes	16/36 (44.4%)	20/36 (55.6%)			2.227; 95% CI: 1.067 – 4.648	0.033*
You had an anal discharge during the last 2 months.						
No	106/168 (63.1%)	62/168 (36.9%)	4.874	0.027	1.0	
Yes	8/21 (38.1%)	1321 (61.9%)			0.360; 95% CI: 0.141 – 0.917	0.032*
I have trouble letting a sex partner know that I want to have safer sex only						
No	79/119 (66.4%)	40/119 (33.6%)	4.944	0.026	1.0	
Yes	35/70 (50.0%)	35/70 (50.0%)			0.506; 95% CI: 0.277 – 0.926	0.027*
I can avoid situations that I consider sexually risky						
No	12/14 (85.7%)	2/14 (14.3%)	4.074	0.044	1.0	
Yes	102/175 (58.3%)	73/175 (41.7%)			0.233; 95% CI: 0.051 – 1.072	0.061

Table 7. Bivariate correlation between Age in years and consistent condom use.

		Consistent condom use	Age at discovery of sex orientation
Consistent condom use	Spearman's' rank Correlation	1	-0.164
	Sig. (2-tailed)		0.024*
	N	188	188
Age at discovery of sex orientation	Spearman's' rank Correlation	-0.164	1
	Sig. (2-tailed)	0.024	
	N	188	188

Table 8. Bivariate correlation between age in years and consistent condom use.

		Age in years	Consistent condom use
Age in years	Spearman's' rank Correlation	1	0.043
	Sig. (2-tailed)		0.055
	N	188	188
Consistent condom use	Spearman's' rank Correlation	0.043	1
	Sig. (2-tailed)	0.055	
	N	188	188

Table 9. Bivariate correlation between number of partners and consistent condom use.

		Consistent condom use	Number of partners
Consistent condom use	Spearman's' rank Correlation	1	-0.019
	Sig. (2-tailed)		0.0801
	N	188	188
Number of partners	Spearman's' rank Correlation	-0.019	1
	Sig. (2-tailed)	0.0801	
	N	188	188

Table 10. Follow up (end-line) assessment data.

	Control	experimental	Chi-square	p-value
1in the last 30 days unprotected				
No	53 (46.1%)	89 (54.9%)	1.511	0.029*
Yes	17 (60.7%)	11 (39.3%)		
2a 1Sex partners unprotected				
0	54 (47.9%)	4 (33.3%)		
1	8 (66.7%)	2 (40.0%)		
2	3 (60.0%)	1 (33.3%)		
4	2 (66.7%)	87 (52.1%)	1.009	0.0404*
2a 2Sex partners protected				
0	53 (46.1%)	2 (40.0%)		
1	8 (66.7%)	4 (33.3%)		
2	4 (66.7%)	2 (33.3%)		

4	3 (60.0%)	86 (52.4%)	2.585	0.046*
2b male sex HIV positive				
0	81 (47.1%)	0 (0.0%)	3.114	0.539
1	3 (75.0%)	1 (25.0%)		
2	2 (66.7%)	1 (33.3%)		
3	2 (66.7%)	1 (33.3%)		
4	1 (100.0%)	91 (52.9%)		
2c your sex HIV negative				
0	70 (48.6%)	74 (51.4%)	1.167	0.990
1	7 (53.8%)	6 (46.2%)		
2	10 (50.0%)	10 (50.0%)		
4	3 (50.0%)	3 (50.0%)		
5	1 (50.0%)	1 (50.0%)		
2d your sex never				
0	77 (48.1%)	62 (53.9%)	3.728	0.811
1	14 (53.8%)	12 (46.2%)		
2	10 (50.0%)	10 (50.0%)		
3	6 (54.5%)	5 (45.5%)		
4	3 (50.0%)	3 (50.0%)		
5	4 (80.0%)	1 (20.0%)		
6	1 (50.0%)	1 (50.0%)		
8	1 (100.0%)	0 (0.0%)		
3 lived with partners				
No	54 (50.0%)	54 (50.0%)	1.009	0.604
Yes	40 (50.0%)	40 (50.0%)		
4 long partners				
No	42 (50.0%)	42 (50.0%)	0.000	1.000
Yes	52 (50.0%)	52 (50.0%)		
4 if yes HIV status				
1	2 (50.0%)	2 (50.0%)	2.271	0.321
2	42 (48.3%)	45 (51.7%)		
3	11 (68.8%)	5 (31.2%)		
5 unprotected sex				
No	36 (48.6%)	89 (51.4%)	1.811	0.017*
Yes	10 (66.7%)	5 (33.3%)		
9b how many drinks				
0	36 (48.6%)	38 (51.4%)	0.031	1.000
1	8 (50.0%)	8 (50.0%)		
2	17 (50.0%)	17 (50.0%)		
3	3 (50.0%)	3 (50.0%)		
4	10 (50.0%)	10 (50.0%)		
5	2 (50.0%)	2 (50.0%)		
6	5 (50.0%)	5 (50.0%)		
7	1 (50.0%)	1 (50.0%)		
10	2 (50.0%)	2 (50.0%)		
10 was condom used				
No	36 (70.0%)	3 (30.0%)	1.690	
Yes	7(48.9%)	91 (51.1%)		0.019*
10i any injectable drugs				
No	91 (50.0%)	91 (50.0%)	0.000	1.000
Yes	3 (50.0%)	3 (50.0%)		

Table 11. MSM perceptions on MMT BASIC ID modality skills in HIV and AIDS behavioral risk reduction.

	Frequency	**Percent**
Q1After BASICID	48	51.1%
Q2 interact with others	39	41.5%
Q4 perceive rating of MMT	94	100.0%
Q5 being in touch	94	100.0%
Q6 learnt in influencing others		
1	72	76.6%
2	21	22.3%
3	1	1.1%
Q6i challenges		
1	38	40.4%
2	36	38.3%
3	11	11.7%
4	9	9.6%
Q6bii empower others		
1	79	84.0%

2	15	16.0%
Q6biii perceive MMT panacea		
1	53	56.4%
2	30	31.9%
3	2	2.1%
4	9	9.6%

Table 12: Descriptive statistics of the MMT perceptions amongst respondents in experimental group.

	n	Minimum	Maximum	Mean		Standard deviation
				Statistic	Standard Error	
Q6a) Influencing others	94	1	3	1.24	0.047	0.456
Q6b) Challenges others	94	1	4	1.90	0.098	0.951
Q6c) Empower others	94	1	2	1.16	0.038	0.368
Q6d) MMT enhances cd	94	1	4	1.65	0.095	0.924
Q6e) MMT not panacea	94	1	3	1.12	0.037	0.355

Table 13.

Variable			Chi-square	p-value	OR;95% CI	p-value
You have done your best to reduce chances of transmitting or getting infected with HIV.						
No	15/16 (93.8%)	1/16 (6.2%)	8.163	0.004	1.00.	
Yes	99/173 (57.2%)	74/173 (42.8%)			0.089; 95% CI: 0.012 – 0.690	0.021*
Rate your perceived greatest barriers to HIV risk behavior change						
Sexual impulse and/or MSM Social affiliation	56/88 (63.6%)	32/88 (36.4%	9.656	0.022	0.727; 95% CI: 0.295 – 1.1791	0.489
HAART availability &/ or peer group acceptance	18/42 (42.9%)	24/42 (57.1%)			1.697; 95% CI: 0.625 – 4.606	0.299
All of the above	26/34 (76.5%)	8/34 (23.5%)			0.392; 95% CI: 0.128 – 1.199	0.100*
Don't know	14/25 (56.0%)	11/25 (44.0%)			1.0	
During the last month you or your partner often used condom.						
Very often	27/34 (79.4%)	7/34 (20.6%)	19.846		0.069; 95% CI:0.009-0.549	0.012*
A good deal	13/14 (92.9%)	1/14 (7.1 %)			0.232; 95% CI:0.092– 0.587.	0.020*
Not much	27/34 (79.4%)	7/34 (20.6%)			0.608;-95%CI: 0.298 – 1.240	0.171
Not at all	13/14 (92.9%)	1/14 (7.1%)			000; n/a	0.999
Don't know	3/3 (100.0%)	0/3 (0.0%)			1.0	
You have discussed with your partners how to reduce chances of transmitting or being infected with HIV.						
No	47/61 (77.0%)	14/61 (23.0%)	10.535	0.001	1.0	
Yes	67/128 (52.3%)	61/128 (47.7%)			0.327; 95% CI:0.164– 0.652	0.002*
You discussed HIV/AIDS or STDs with some of your non-paying partners.						
No	28/37 (75.7%)	9/37 (24.3%)	4.534	0.033	1.0	
Yes	86/152 (56.6%)	66/152 (43.4%)			0.419; 95% CI:0.185– .948	0.037*
You have had a genital discharge during the past 2 months.						
No	98/153 (64.1%)	55/153 (35.9%)	4.681	0.030	1.0	
Yes	16/36 (44.4%)	20/36 (55.6%)			2.227; 95% CI: 1.067 – 4.648	0.033*
You have had an anal discharge during the last 2 months.						
No	106/168 (63.1%)	62/168 (36.9%)	4.874	0.027	1.0	
Yes	8/21 (38.1%)	1321 (61.9%)			0.360; 95% CI: 0.141 – 0.917	0.032*
I have trouble letting a sex partner know that I						

want to have safer sex only						
No	79/119 (66.4%)	40/119 (33.6%)	4.944	0.026	1.0	
Yes	35/70 (50.0%)	35/70 (50.0%)			0.506; 95% CI: 0.277 – 0.926	0.027*
I can avoid situations that I consider sexually risky						
No	12/14 (85.7%)	2/14 (14.3%)	4.074	0.044	1.0	
Yes	102/175 (58.3%)	73/175 (41.7%)			0.233; 95% CI: 0.051 – 1.072	0.041*

30 days post intervention Follow up assessment

Table 14. Follow up data.

	Control	**experimental**	**Chi-square**	**p-value**
1in the last 30 days unprotected				
No	17(60.7%)	89 (94%)	1.511	0.029*
Yes	53 (46.1%)	5 (6.1%)		
2 a1Sex partners unprotected				
0	54 (47.9%)	87 (92.6%)	1.009	0.0204*
1	8 (66.7%)	4 (33.3%)		
2	3 (60.0%)	2 (40.0%)		
4	2 (66.7%)	1 (33.3%)		
2 a 1.Sex partners protected				
0	53 (46.1%)	86 (92.4%)	2.585	0.026*
1	8 (66.7%)	4 (33.3%)		
2	4 (66.7%)	2 (33.3%)		
4	3 (60.0%)	2 (40.0%)		
2 b male sex HIV positive				
0	3 (75.1%)	91 (96.8%)	3.114	0.025
1	81 (47.1%)	1 (25.0%)		
2	2 (66.7%)	1 (33.3%)		
3	2 (66.7%)	1 (33.3%)		
4	1 (100.0%)	0 (0.0%)		
2 c your sex HIV negative				
0	70 (48.6%)	74 (78.7%)	1.167	0.039
1	7 (53.8%)	6 (46.2%)		
2	10 (50.0%)	10 (50.0%)		
4	3 (50.0%)	3 (50.0%)		
5	1 (50.0%)	1 (50.0%)		
2 d your sex never				
0	77 (48.1%)	62 (65.9%)	3.728	0.038
1	14 (53.8%)	12 (46.2%)		
2	10 (50.0%)	10 (50.0%)		
3	6 (54.5%)	5 (45.5%)		
4	3 (50.0%)	3 (50.0%)		
5	4 (80.0%)	1 (20.0%)		
6	1 (50.0%)	1 (50.0%)		
8	1 (100.0%)	0 (0.0%)		
3 lived with partners				
No	54 (50.0%)	54 (57.4%)	1.009	0.0604
Yes	40 (50.0%)	40 (50.0%)		
4 long term partners				
No	52 (50.0%)	12 (16.0%)	0.000	
Yes	42 (50.0%)	82 (84.0%)		0.001*
4 if yes HIV status				
1	2 (50.0%)	2 (50.0%)	2.271	0.321
2	42 (48.3%)	45 (51.7%)		
3	11 (68.8%)	5 (31.2%)		
5 unprotected sex				
No	10(66.7)	89 (94%)	1.811	0.017*
Yes	36 (77.6%)	5 (33.3%)		
9b how many drinks				
0	36 (48.6%)	38 (51.4%)	0.031	1.000
1	8 (50.0%)	8 (50.0%)		
2	17 (50.0%)	17 (50.0%)		
3	3 (50.0%)	3 (50.0%)		
4	10 (50.0%)	10 (50.0%)		
5	2 (50.0%)	2 (50.0%)		
6	5 (50.0%)	5 (50.0%)		
7	1 (50.0%)	1 (50.0%)		

10	2 (50.0%)	2 (50.0%)		
10 was condom used				
No	36 (70.0%)	3 (30.0%)	1.690	
Yes	7(48.9%)	91 (51.1%)		0.019*

consistent condom use/ multiple Sexual partners P-Value

Table 15

Personal risky	**Experimental**	**Control**	
Behavior starts with you	(59.5%)	40.5%	0.050
Removing arousal trigger	(59.5%)	40.5%	0.015
Risky relationships Narrowing	(61.5%)	38.5%	0.045
Getting accountable partner	(62.7%)	37.3%	0.030
Getting accountable partner	(60.5%)	39.5%	0.014
Trend to modify setting	(57.3%)	42.7%	0.014
Have done your best to reduce	(57.2%)	57.2%	0.004
Sexual impulse/social affiliations	(63.6%)	36.4%	0.022
Condom use	(52.7%)	43.6%	0.001
Discussed HIV with partner	(52.3%)	47.7%	0.001
Reduced multiple partners	56.6%)	43.4%	0.003

Table 16

	Experimental group	**Control group**	**P-value**
Consistent condom use in the last 30 days	93%	60.7%	P=0.029
Condom use all times (yes)	51.1 %	48.9	P=0.019
Sex partners unprotected (NO)	52.1%	47.9%	P=0.040
Sex partners protected (NO)	52.4%	46%	P=0.046
Long term partners protected (YES)	84%	50.0%	P=0.001
Condom use all times (yes)	51.4%	77.6%	P=0.017