Motivational Groups Support Adherence to Antiretroviral Therapy and use of Risk Reduction Behaviors in HIV Positive Nigerian Women: A Pilot Study

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Abstract

Nigerian women comprise the fastest growing group of persons with AIDS in Africa. Antiretroviral therapy has transformed the course of HIV/AIDS to a treatable, chronic illness worldwide. The purpose of this pilot study was to assess the efficacy of a group intervention using motivational interviewing (MI) to promote adherence to antiretroviral therapy (ART) and use of risk reduction behaviors (RRB) among HIV-infected women in Nigeria. Recruited participants (n=60) were randomly assigned to the motivational group or the health promotion program (HPP) control group. The 6 month follow-up results indicate that, compared to the control group, MI participants reported significantly higher levels of adherence to ART, higher knowledge of HIV, higher use of condoms/protection during sexual encounters and decision-making not to have sex when no protection was available. The MI participants also had fewer mean number of sexual partners. MI in group format shows promise in promoting adherence to ART and use of RRB in HIV-infected Nigerian women.

Keywords

Adherence; Risk behaviors; Nigeria; HIV+ Women; Motivational interviewing

Introduction

In the absence of a vaccine or cure for AIDS, the spread of HIV must be controlled through programs designed to distribute antiretroviral therapy (ART) and encourage adherence, in addition to prevention strategies such as ART to pregnant women, male circumcision, and pre-and post-exposure prophylaxis. Prevention efforts in Nigeria, as in other countries, has met with some difficulties. Factors influencing prevention include the natural history of HIV infection and AIDS in the context of current health issues in Nigeria, current beliefs, and social and cultural context of HIV and AIDS. The HIV epidemic is having a devastating impact on Nigeria. In 2010 HIV prevalence was 4.1%, which translates to about 3.1 million people living with HIV in Nigeria, the second-worst affected country in the world, after South Africa.[1, 2] Nigerian women have been disproportionately burdened by the impact of HIV disease. Current estimates indicate that women account for 61.5% of all cases among adults aged 15 and above living with HIV [1]. In addition, seroprevalence rates ranging from

48.8% to 60% have been observed among commercial sex workers (CSWs) in some states in Nigeria.[3, 4] Several factors place Nigerian women at increased risk of HIV infection including religious and cultural practices that permit marriage at an early age, lack of information on sexual health and HIV transmission, low level of condom use, and women's lack of power to insist upon condom use during sexual encounters. [5] Women are also more likely to be vulnerable to HIV infection within marriages because their husbands are older and more likely to have had multiple sexual partners in the past and/or extramarital relationships during the marriage. [6, 7] Other factors that contribute to HIV transmission in this population include blood transfusion during childbirth, [8] inequalities in income and wealth between men and women which cause economic dependence and limit women's ability to leave abusive relationships, polygamy, and societal norms that do not support condom use. [9] Perinatal transmission is an important factor for women and Nigeria now has the highest number of pregnant women in need of prevention of mother to child transmission (PMTCT) services.[10] There are 57,000 HIV infected children born each year.[11] These cases could be practically eliminated with widespread adherence to PMTCT.

Background

Antiretroviral therapy (ART) prolongs life, reduces HIV viral load (VL), and, when viral loads are undetectable, facilitates reduction in HIV transmission to partners and unborn children. Practicing safer sex will also protect HIV infected women from acquiring HIV-drug resistant strains, other sexually transmitted infections, and unplanned pregnancies. In recognition of the improvements in morbidity, mortality, and HIV prevention, the World Health Organization is expanding distribution and use of ART worldwide.[12] ART is available free in Nigeria through governmental programs and through the US President's Emergency Plan for AIDS Relief (PEPFAR) funded clinics.

In Nigeria, varying levels of ART adherence have been reported. For example, the levels reported for studies conducted in Kano (Northern Nigeria), Niger Delta, Ile-Ife, Benin City, and Ibadan (Southern Nigeria) are 80% [13], 49.2% [14], 44% [15], 58.1% [16], and 63%, [17, 18] respectively. We could find no studies that have solely examined the adherence patterns of HIV-infected women in Nigeria. Non-adherence has been observed to be higher among women, [19] respondents without formal education, and the unemployed. [14] Other barriers to adherence in both men and women include forgetfulness, and fear of disclosure. [17] These studies highlight the need for interventions to promote ART adherence among Nigerians, particularly HIV-infected Nigerian women. To date, few adherence interventions in Nigeria have been reported. One project found that treatment partners for HIV-infected patients improved medication pick up from pharmacy and initial improvement in viral load, but this was not sustained over the 48 week follow-up. [20] A multi-component intervention that included support groups and group health education showed higher adherence and significantly improved CD4 counts and viral loads at 24 weeks for those in the intervention compared to standard care. Of the 121 participants, 70% were women. [21] These findings suggest group interventions may be successful in improving adherence and clinical outcomes.

As HIV-infected women regain health and strength as a result of ART, concerns have emerged that they might disregard protective practices as their health improves. Research has shown that approximately 60% of HIV-positive women in Nigeria do not use condoms although they are aware that condom use would protect against HIV transmission. [22–24] Akinyemi noted, in a retrospective chart review of condom use in 868 patients on ART for 6 months in Ibadan, Nigeria, that although condom use increased from 14% to 43.3% after starting ART, significantly more men (49.7%) than women (39.8%) reported using condoms at their last clinic visit. [25] Marital status and educational level was associated with condom use. In addition, patients' socially normative desires for marriage, pregnancy, and children

may affect their ability to stay on therapy, follow the prescribed treatment regimen, and engage in protective sexual practices.[7]

ART treatment is now considered a form of HIV prevention. The resultant lower or undetectable plasma viral loads are associated with a lower risk of HIV transmission. [26–30] With low/undetectable viral load, as a result of early HIV therapy in African countries, HIV transmission was drastically reduced.[29] Although one meta-analysis found a transmission rate of 1 per 79 person years in those who achieved plasma VL <400 copies,[30] condom use and safer sex behaviors combined with ART are important for consistent prevention of HIV transmission. Baeten and colleagues[31] found a moderate correlation between plasma VL to endocervical genital fluid VL (spearman rho = 0.56). They also noted that, in HIV infected women, for each one $\log_{10}$ increase in genital VL, there was a 2.20 increased risk of transmitting HIV to one's partner. However, in this sample, transmission also occurred from a small number of women who had undetectable endocervical VL (below 240 copies per mL) at the time of sampling but had a detectable plasma VL (above 240 copies per mL). VL in endocervical fluids in women may also vary due to the presence menstrual blood.[31] Thus, an intervention that combines ART adherence and RRB could have important clinical and public health implications.

The high prevalence of HIV infection among Nigerian women coupled with their lower levels of adherence and condom use suggests a need for culturally relevant, effective, dual-focused integrated interventions for this vulnerable group. To date, no theoretically driven integrated interventions have been developed and tested for HIV-infected women in Nigeria.

Motivational Interviewing

Motivational interviewing (MI) is a directive counseling method that focuses on resolving ambivalence toward and building motivation for behavior change. MI counseling has been successful in changing many health behaviors in the US, including substance use, fruit and vegetable intake, and physical activity. [32–35] In the US, MI has been recently used with HIV-infected persons to address substance use, [36, 37] medication adherence, [36, 38–40] and safer sex preventive behaviors. [37, 40–45] There are few reports of MI used in Sub-Saharan countries and none in Nigeria. Two studies reported on the feasibility of training health care workers in South Africa, with limited effectiveness in terms of its use by the health care workers, but neither report on patient outcomes. [46, 47]

The Keeping Healthy and Active with Risk reduction and Medication Adherence (KHARMA) Project used MI in a group format to promote both medication adherence and risk reduction behaviors in HIV-infected women in a southern state in the US. Women in this randomized trial were followed for 9 months after completion of an eight session MI group intervention. The control was an attention equivalent eight session health promotion program (HPP) that employed health education methods of lecture/discussion and educational games. Women who attended at least 7 of the 8 MI sessions had higher levels of adherence as measured by electronic drug monitoring caps at all follow-up time points. A larger proportion of high attendees in the MI group also reported practicing abstinence and using protection with sex in the past 3 months compared to the controls.[40] We adapted and culturally tailored the KHARMA Project for Nigerian HIV-infected women for this pilot study.

The Study Aims

The purpose of this paper is to report the results of a pilot project evaluating the feasibility and efficacy of a culturally adapted motivational group (MI) intervention to promote adherence to ART and use of RRB in HIV-infected Nigerian women. We hypothesized that

women exposed to the MI group would have higher self-reported adherence rates and a larger proportion would report consistent use of safer sex practices such as condoms.

Methods

Design, Setting and Participants

This pilot study was a quasi-experimental, two group post-test only design. It was conducted in collaboration with the Institute for Health Research and Development (IHRD) in Lagos, Nigeria. The site for this study was the HIV Clinic at the Nigerian Institute for Medical Research (NIMR). This is one of the Federal Government of Nigeria sites offering ART and comprehensive care for HIV/AIDS patients. It is one of the major training facilities in Nigeria for HIV/AIDS. NIMR provides space for IHRD to conduct research projects including PEPFAR-related research and service delivery. At the clinic, ART is provided through PEPFAR, thus women who need ART are seen at this center. Currently over 8,000 patients are enrolled and obtaining ART treatment at this site; 65–75% are women.

Women were referred for the study by providers, or responded to recruiters or posters and fliers placed at the clinic. The eligibility criteria for the study included: 1) HIV-infected; 2) Able to read and speak English (the national language) since the intervention and assessments were conducted in English; 3) Prescribed antiretroviral medications; 4) Willing to attend group sessions and participate in the study. Women were ineligible if they were severely ill or had cognitive impairments or appeared severely depressed as assessed by the recruiter and the participant's ability to understand the informed consent form. Pregnant women were not excluded from this study.

Ninety women were screened and a convenience sample of 60 women was enrolled. For analysis using a 2 sample *t* test with 30 per group (2 groups), we had 80% power to detect an effect size of 0.74 (large effect).[48] Once enrolled in the study, participants were randomly assigned in blocks of 4 to either the intervention (MI) group (n = 30) or the control (HPP) group (n = 30). Groups started within 1–2 weeks of enrollment and met for 8 weekly sessions. Over the course of the project, a total of 4 MI and 4 HPP groups were formed.

Intervention and Control Conditions

The KHARMA-Nigeria MI intervention and HPP control group sessions were culturally adapted from the KHARMA Project conducted in the USA. [40, 49] To culturally tailor the project, we enlisted the help of a Nigerian born graduate nursing student who reviewed the manuals for each session and made appropriate changes to reflect the culture of Nigerian women from all tribal backgrounds in Lagos. The session manuals were again reviewed by the Nigerian facilitators during training sessions in Lagos and a few additional changes were made as needed. Table 1 contains an outline of the session topics for both conditions.

Intervention Condition

The MI group intervention consisted of eight sessions based in motivational interviewing delivered in a group format. Using Bandura's model of Social Cognitive Theory [50], the intervention is designed to enhance self-efficacy and HIV knowledge, promote outcome expectancy, and develop personal goals related to ART adherence and safer sex behaviors. Motivational interviewing techniques help to overcome resistance/ambivalence to both behaviors. The sessions lasted about 1.5 to 2 hours, and were led by two trained MI facilitators. An introductory session explored lifestyles related to both topics. Sessions 2–7 include a) exploring awareness and ambivalence of the good and not so good things about taking ART; b) developing and dealing with discrepancies between current adherence behaviors and future goals; c) enhancing adherence self-efficacy by sharing and building on

successes; d) strengthening self-efficacy for male/female condom skills and knowledge; e) exploring ambivalence about condom use and practicing condom negotiation skills; f) discussing the pros and cons of HIV status disclosure and building disclosure skills. The final session reviews core values and behavior goals related to both adherence and use of safer sex behaviors. At the end of each session women were asked to identify personal goals related to the topic discussed and they could share these with the group if desired. Participants' progress toward their goals was discussed at the beginning of the following session. During the sessions, facilitators used MI techniques such as reflections, decisional balance, motivation and confidence rulers, and rolling with resistance to examine barriers and discrepancies between current behaviors and future goals. They also used these methods to support participants' self-efficacy to develop strategies to enhance ART adherence and use of risk reduction behaviors.

Control Condition—The HPP control group sessions were led by two trained facilitators and were the same length and time as the MI group. Facilitators used health education techniques of lecture/discussion/educational games and focused on nutrition (2 sessions), exercise (2 sessions), women's health (2 sessions) and stress reduction (1 session), and a summary session. All content was tailored and culturally adapted for HIV-infected women in Lagos, Nigeria. Simple exercises, role-plays and practicing stress reduction techniques were included. Topics of adherence and RRB were not discussed in these groups and facilitators were instructed to refocus the group if they came up in discussion.

To promote retention, participants in both conditions received incentives such as meals, transportation monies, toiletry items, caps, pens, memo pads. Women in the MI group also received male and female condoms, dental dams, and lubricants to support safer sex practices.

Facilitator training—We trained 3 health workers in MI and the conduct of the MI group intervention as well as 3 health workers in the conduct of the HPP control condition. Facilitators were Nigerian women with nursing, social work, and counseling backgrounds and had experience working with HIV-infected women and leading group interventions in other research studies. We chose health workers because they are more abundant than physicians and also commonly used in low resource countries to provide health care for HIV infected persons. The MI group facilitators received a 24 hour training program presented over one week by the principal investigator (MMH). The training program included motivational interviewing techniques, practice, and conduct of the group sessions, as well as a brief review of information about HIV and antiretroviral medications, and skills of male and female condom application. Each facilitator practiced role plays as a MI group facilitator and received a certificate of completion at the end of the training.

HPP group facilitators received about 24 hours of training in the content and conduct of the HPP sessions: stress and depression, nutrition, exercise, and women's health promotion behaviors. MI and HPP trained facilitators did not cross over to lead other groups.

Data collection

The study was approved by the Institutional Review Boards at Emory University in Atlanta, Georgia, United States and the IHRD in Lagos, Nigeria. No serious adverse events occurred as a result of this project.

Recruitment began in April 2008. The follow-up assessment occurred at 6 months after the final group session. All assessments were completed by December, 2008.

Measures

Adherence was measured using five self-report instruments. The Antiretroviral Medication General Adherence Scale (AGAS) is a 5-item single-dimensional measure that assesses the ease and ability of participants to take ART according to a health care provider's recommendations in the previous 30 days. [51] Higher scores reflect better adherence. Cronbach's alpha in this sample was 0.76 (n = 44), which is slightly lower than that of 0.85 for the US sample (n = 193).

A Visual Analogue Scale (VAS) was used to identify the proportion of all medications taken over a 30 day period. Participants were asked to mark a point on a 100mm line to indicate the percent of all of their ART medications taken in the previous 30 days. The line was anchored by an empty pill bottle at the bottom (indicating zero), a half full pill bottle in the center (indicating 50%), and a full pill bottle at the top (indicating 100%). The ACTG Adherence questionnaire [52] was used to determine the reasons a person missed a medication in the past 30 days. This brief 14-item questionnaire is easily administered to a broad range of patients asking how often their medications were missed for each of the 14 "reasons" using a 4-point Likert scale ranging from "never" to "often." After reverse scoring, higher scores indicate fewer missed medications and better adherence to their current medication regimen. Alpha reliability was 0.98 (n = 42) which is consistent with our US sample.

We also used a single item scale from the ACTG measure asking when was the last time you missed taking any of your medications with a 6-point scaled response ranging from never (0) to more than 3 months ago (1), to within the past week (5).

To assess ART self-management we used a 22 item instrument that posed questions about how a person might manage her medications, such as: keeping track of side-effects or spreading out doses when running out of pills. Responses to how often the behavior occurred were on a 5 point Likert scale from Never (1) to Always (5). Chronbach's alpha for this instrument was 0.84 (n = 35).

HIV Knowledge was assessed using the 18 item brief HIV Knowledge Questionnaire (HIV-KQ-18) developed by Carey and Shroder. [53] It is a *true/false* survey that measures knowledge related to sexual transmission of HIV. The authors report it is sensitive to change from risk reduction educational interventions, and is practical for groups with low literacy such as ours. Reliability (Kuder-Richardson 20, KR20) from this pilot project was 0.77 (n = 48) which is consistent with that reported by Carey and Schroder.

Condom use and safer sex risk reduction behaviors were measured with our modified version of the Centers for Disease Control Sexual Behavior Questions, called the Adapted CDC Sexual Behavior Questions (ACSBQ). [54] This is a 58 item questionnaire about current sexual activity, sexual activity with a main partner and a casual partner, male and female partners. Sexual behaviors addressed include vaginal, oral, anal sex; use of alcohol or drugs before sex; use of protection (such as male condom, female condom, dental dam) during sex. Items require a 'yes/no' if the behavior was used and scaled response related to frequency of use. Items for this analysis include the number of partners, use of protection in the past 3 months, use of protection at the last sexual encounter and last vaginal sexual encounter with main partner, making a decision not to have sex because no protection was available, use of drugs and use of alcohol before sex. Anal sex, though a risky behavior was not included in the analysis because only four women (two from each group) reported this behavior.

Data analysis

Statistical analyses were performed at the 5% significance level using PASW version 18.0 (July 30, 2009; IBM Corporation). All data were reviewed for outliers, missing data, and normality assumptions prior to analysis. As reported above, reliability statistics were performed on all of the instruments: Chronbach's alpha was reported for the Likert scale response items and the Kuder-Richardson 20 (KR20) was reported for the dichotomous (true/false) response items for the HIV knowledge test.

Differences in group proportions were conducted using the Chi-square test for independence, using the Fisher's exact test when more than 20% of the cells had expected counts of < 5, via the PASW Exact Tests module. Differences between means were conducted using the t-test for independent groups when the normality assumptions were met or the Mann-Whitney test when the distributions were skewed. The Z-test corrected for ties is reported for the Mann-Whitney test results.

Results

Sample

For this post-test only pilot study, analysis was conducted on the 48 of 60 participants who completed the 6 month follow-up assessment (28 in the MI group and 20 in the HPP group), an 80% retention rate. When those lost to follow-up are compared by group, 2/30 (6.67%) were missing from MI and 10/30 (33.33%) were missing from HPP, which is a statistically significant difference (chi-square=6.67, DF=1, p=0.0098).

With respect to demographics, all of the five major Nigerian ethnic groups (Yoruba, Ibo, Hausa, Efik and Ijaw) were represented. Consistent with the demographics of Lagos, the majority of participants were from the Yoruba (44.7%) and Ibo (34%) tribes. The ages ranged from 18 to 45 with an average of 31 for the sample. Most of the participants (79.2%) identified with a Christian religion. Over a third reported having children and almost 46% reported being married or in a committed relationship. The majority of women were well educated and employed. The median monthly income was lower in the MI group. The sample annual median income (US$ 3137) was higher than the annual Gross National Income reported by UNICEF for Nigeria (US$ 1140) for 2009.[55]

With respect to sexual identity, 73% self-identified as heterosexual and a few self-identified as homosexual/gay or bisexual. Ninety-three percent (26) of the MI group and 85% (17) of the HPP group reported being sexually active in the past 3 months. At the time of the follow-up, 45 (93.8%) were on ART (28 from MI group and 17 from HPP group). Characteristics of the sample are in Table 2. No significant differences were seen between the two groups except that the MI group had proportionately more Ibo whereas the HPP group had proportionately more Yoruba.

Adherence

At the time of follow-up, none of the MI participants and three of the HPP participants reported having stopped or discontinued taking their ART medications at some point in the prior 30 days, either by their provider or themselves. We do not have data on when or how long this occurred. Based on results using the Mann-Whitney U test, using the Z test statistic corrected for ties, for analysis of each instrument, the MI group had significantly higher self-reported adherence rates on all measures (Table 3). On the Visual Analogue Scale (VAS) all 26 (100%) of the MI respondents reported taking 100% of their HIV drugs compared to only 11 (61.1%) of the 18 HPP respondents who took 90% or more of their HIV drugs (Fisher's

exact test (FET) p<0.001). The three women from HPP who reported stopping meds at some point in the past 30 days reported VAS adherence rates of 50%, 90%, and 100%.

The mean score for the Antiretroviral General Adherence Scale for the MI group was 93% (SD 11.1) versus 77.8% (SD 16.1), for the HPP group (MW Z = −3.581, p<0.001); and mean score for the ACTG Reasons for Missing Medications score was 40.8 (SD 4.7) for the MI group vs. 35.2 (SD = 9.8) for HPP group (MW Z = −3.072, p = 0.002). On the single item adherence question, 93% of MI participants reported "never" missing any medications compared to 40% of the HPP group (χ^2=15.777, df =1, p < .0001). With respect to total self-management scores, there were no significant differences between mean scores of the two groups. The MI group also had significantly higher mean HIVKQ-18 knowledge scores: 83.7% (SD 15.4) correct vs. 74.7% (SD 15.8) (Z = −2.394, p = 0.017).

Risk Reduction Behaviors

Women in both groups reported having from 0 to 8 sexual partners. The MI group reported, on average, significantly fewer partners (1.5 (SD 1.6)) than the HPP group (2.8 (SD 2.4)) (MW Z=−1.983, p = 0.047, n=44) (Table 4). Based on Chi Square analyses, a significantly greater proportion of women in the MI group reported using condoms/protection in the past 3 months (84.6% MI vs. 43.8% HPP; FET p = 0.014), at their last sexual encounter (88.9% MI vs. 52.6% HPP; FET p = 0.015), and at their last vaginal sexual encounter with main partner (100% MI vs. 60% HPP; FET p = 0.007). In the past 3 months, 92% of the women in the MI group reported making a decision not to have sex because no protection was available compared to 29.4% of the HPP group (χ^2=17.838, df =1, p < .001). There were no significant differences between groups in the use of alcohol or drugs before sex.

Process Evaluation

We monitored attendance at all group sessions to assess dosage of the intervention. For the both the MI and HPP groups 30 women were recruited for each group and 93.3% of the participants in each group attended at least 7 of the 8 sessions.

Therefore, each group received an adequate dose of the MI intervention and HPP control program.

To determine how well participants liked the group sessions and rated each group session in terms of indicators supporting the use of MI (participants talked more than the facilitator, felt listened to, and felt understood), we conducted an evaluation with every participant at the end of each session. As anticipated, there were no significant differences between groups in how well the sessions were liked. Six of the MI sessions consistently scored higher in the three MI-related indicators when compared to the comparable HPP session. These higher scores indicate that the MI facilitators were indeed using MI consistent techniques and maintaining the spirit of MI. Sessions 5 (safer sex knowledge and skills) and 6 (pros/cons and ambivalence about using RRB) scored lower in MI consistent ratings, demonstrating a need to strengthen its use in these sessions.

Discussion

We believe we are among the first to train health care workers and use MI to promote adherence to ART and RRB in Nigeria. We conducted a pilot study to test the efficacy of an 8-session motivational group intervention to promote adherence to ART and RRB in a sample of 60 HIV-infected women in Lagos, Nigeria. We conducted both process and outcome evaluations. Our findings indicate that, for the majority of the MI group sessions, facilitators were practicing MI consistent behaviors. We found that in the 48 women who returned for the follow-up assessment, those in the MI group had significantly higher self-

reported adherence rates and significantly more frequent use of RRB when compared to those in the attention equivalent health promotion control group. Significantly more women in the MI group returned for follow-up. Unfortunately, we have no data on why participants were missing or lost to follow-up, however, we hypothesize that the MI intervention motivated participants to stay engaged with the project.

We could find no studies with this dual focus tailored to HIV-infected Nigerian women. Reports indicate that Nigerian women's ART adherence is low and that although use of condoms increases after ART initiation, it is still low. We were able to demonstrate considerably higher levels of condom use after our intervention (84%) than those reported by Akinyemi et al. (39%). [25] We also found higher levels of HIV Knowledge in the MI group, similar to the findings of Olley et al 2007 who noted an increase in knowledge after attendance in a support group for 81 HIV-infected adults (55% women). [56]

Conclusions

We have demonstrated success at culturally tailoring and implementing a dual-focused, gender specific intervention for HIV-infected Nigerian women. These data provide preliminary support for use of MI in a group format to promote outcomes of adherence to ART and use of RRB in HIV-infected Nigerian women. Our findings have implications for nursing and health care practice as well as research, especially in light of recent findings supporting ART treatment as prevention.[28] First, nurses and health care workers should focus attention on these dual outcomes when counseling HIV-infected women. Second, MI in a group format is a useful counseling method to resolve ambivalence and promote adherence to both behaviors. The group format was well liked, well attended, and effective for our sample of educated Nigerian women.

Our results also indicate that, after revising the intervention sessions 5 and 6, conducting a large scale prospective clinical trial to test the efficacy of MI in promoting adherence to both ART and risk reduction behaviors in HIV-infected Nigerian women who are prescribed ART is the next step. Additional factors such as tribal practices, commercial sex work, pregnancy, ART regimens need to be examined related to adherence. This project could also be extended to HIV-positive women in other low-resource countries.

There are several limitations to our findings. The post-test only design limits our ability to conduct analysis to the 48 women who returned for follow-up assessments. Also, we could only conduct comparisons between groups and no within groups comparisons could be made. We collected the demographic data on follow-up and have no data to determine if these participants were different from those who did follow-up. The only differences between the participants who did attend the follow-up visit were that there were more Yoruba in the HPP and more Ibo in the MI. These differences could be due to a selection bias because of their respective cultural differences, alternative practices, or health beliefs. The small sample limits the ability to generalize to all women in Nigeria. And the 20% attrition rate over 6 months indicates more attention to participant tracking is needed. Also, we did not collect clinical data on CD4 and HIV viral load results, or information on names of ART medications which would have strengthened our findings. All measures were self reported and could be subject to bias from poor recall or social desirability. Nonetheless, both groups self-reported non adherence and non use of condoms.

Acknowledgments

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Table 1

Topics for the Motivational Group and Heath Promotion Group Session

Motivational Group Topics	Health Promotion Program Topics
1. Introduction, Group Guidelines, Exploration of Lifestyles	1. Introduction & Overview of the effects of nutrition, exercise and stress on the body and immune system
2. ART Awareness: The Good Things and the Not so Good Things	2. Nutrition Part I: Eating for Energy
3. ART Adherence: Change & Exploring Goals	3. Nutrition Part II: Cholesterol, Fat, & Label Reading
4. Sharing successes & ART Strategies	4. Exercise & Fitness Part I: The Awareness of Physical changes and how to deal with them
5. Risk Reduction behavior: Knowledge & Skills	5. Exercise & Fitness Part II: The Importance of a Physically Active Lifestyle Weight Changes: Recognizing the ups and downs of body weight
6. Risk Reduction behavior: Balance & Negotiation	6. Stress & Depression: Signs, Symptoms, & some Solutions. General Wellness: lung cancer and smoking cessation and Lymphoma
7. Disclosure of HIV Status: To tell or Not to Tell	7. Women's Health: The Importance of Breast Self exam and Understanding Menstruation & Menopause
8. Summary & Termination: Putting it all Together with Goals and Values	8. Women's Health: Recognizing & Understanding Gynecological Problems. Group Summary

Table 2

Sample Characteristics: Means (Standard Deviations), Medians, Counts (% to total)

Characteristic	Total n=48	MI n=28	HPP n=20	Tests for Group Differences
Age mean (SD)	30.7 (5.9)	31.0 (5.3)	30.2 (6.8)	T=0.480 (df=46) p=0.633
Tribal ethnicity n (%)				χ^2=10.272 (df=2)
Hausa	3 (6.3%)	1 (3.6%)	2 (10.0%)	p=0.006 [Ibo vs. Yorba vs. other]
Ibo	16 (33.3%)	14 (50.0%)	2 (10.0%)	
Yoruba	21 (43.8%)	11 (39.3%)	10 (50.0%)	
Efik	2 (4.2%)	1 (3.6%)	1 (5.0%)	
Ijaw	4 (8.3%)	0 (0.0%)	4 (20.0%)	
Other	1 (2.1%)	0 (0.0%)	1 (5.0%)	
Refused to Answer	1 (2.1%)	1 (3.6%)	0 (0.0%)	
Education n (%)				χ^2=0.823 (df=1)
Junior secondary school	5 (10.4%)	2 (7.1%)	3 (15.0%)	p=0.364 [Jr/Sr vs College/Grad]
Senior secondary school	13 (27.1%)	10 (35.7%)	3 (15.0%)	
College or Technical school	7 (14.6%)	5 (17.9%)	2 (10.0%)	
Graduate or Professional school	23 (47.9%)	11 (39.3%)	12 (60.0%)	
Religion n (%)				FET p=0.721
Christian/Catholic/Pentecostal	38 (79.2%)	23 (82.1%)	15 (75.0%)	
Muslim/Traditional/African/Other/None/Refused	10 (20.8%)	5 (17.9%)	5 (25.0%)	
Marital status n (%)				χ^2=0.606 (df=2)
Married/Committed Relationship	22 (45.8%)	14 (50.0%)	8 (40.0%)	p=0.739 [Married vs. Sep/Div vs. Never/ Refused]
Separated/Divorced/Widowed	6 (12.5%)	4 (14.3%)	2 (10.0%)	
Never been married	14 (29.2%)	8 (28.6%)	6 (30.0%)	
Refused to answer	6 (12.5%)	2 (7.1%)	4 (20.0%)	
Other household members who are HIV+ n (%) yes	11 (22.9%)	6 (21.4%)	5.0 (25.0%)	FET p=1.00
Employed n (%) yes	37 (77.1%)	22 (78.6%)	15 (75.0%)	FET p=1.00
Monthly income				
(in Naira) mean (SD)	66,000 (90,027)	40,125 (28,214)	98,684 (125,992)	MW Z=−1.437, p=0.151
	Med=40,000	Med=30,000	Med=70,000	
(in US Dollars: $1.00=153 Naira; as of March 1, 2011)	$431.37 (588.41)	$262.25(184.40)	$644.99 (823.47)	
	Med=$261.44	Med=$196.08	Med=$457.52	
Characteristic	**Total n=48**	**MI n=28**	**HPP n=20**	**Tests for Group Differences**
Children n (%) yes	19 (39.6%)	13 (46.4%)	6 (30.0%)	χ^2=1.571 (df=1) p=0.210
Mean (SD)	3.1 (1.3)	2.9 (1.2)	3.3 (1.5)	MW Z=−0.494, p=0.621
Median	Med=3.0	Med=3.0	Med=3.0	
Sexual identity n (%)				χ^2=1.088 (df=1)

Characteristic	Total n=48	MI n=28	HPP n=20	Tests for Group Differences
Straight, heterosexual	35 (72.9%)	22 (78.6%)	13 (65.0%)	p=0.297 [straight vs. other]
Gay, homosexual	1 (2.1%)	1 (3.6%)	0 (0.0%)	
Bisexual	6 (12.5%)	2 (7.1%)	4 (20.0%)	
None of the Above, unsure or Refuse to Answer	6 (12.5%)	3 (10.7%)	3 (15.0%)	
During the past 3 mo, have you had sex?	43 (89.6%)	26 (92.9%)	17 (85.0%)	FET p=0.677
On ART at follow-up?	45 (93.8%)	28 (100.0%)	17 (85.0%)	FET p=0.066

T T-test for Independence; FET Fisher's Exact Test; MW Mann Whitney Test for Independence

Table 3

Adherence Measures: Means (Standard Deviations), Medians, Counts (% to total)

Adherence Measure	Total n=48	MI n=28	HPP n=20	Tests for Group Differences
Concerning all your HIV drugs in the past 30 days, I took _____ %	n=44 [4 missing]	n=26 [2 missing]	n=18 [2 missing]	FET p<0.001 [100% vs. <100%]
0%	1 (2.3%)	0 (0.0%)	1 (5.6%)	
50%	3 (6.8%)	0 (0.0%)	3 (16.7%)	
75%	1 (2.3%)	0 (0.0%)	1 (5.6%)	
80%	2 (4.5%)	0 (0.0%)	2 (11.1%)	
90%	1 (2.3%)	0 (0.0%)	1 (5.6%)	
95%	1 (2.3%)	0 (0.0%)	1 (5.6%)	
100%	35 (79.5%)	26 (100.0%)	9 (50.0%)	
AGAS (as percentage)				
mean (SD)	86.8% (15.3%)	93.2% (11.1%)	77.8% (16.1%)	MW Z=−3.581, p<0.001
Median	Med 88.3%	Med 100.0%	Med 83.3%	
ACTG Reasons for Missing Meds mean (SD)	38.4 (7.8)	40.8 (4.7)	35.2 (9.8)	MW Z=−3.072, p=0.002
Median	Med 42.0	Med 42.0	Med 39.5	
Never Missed Meds n (%)	34 (70.8%)	26 (92.9%)	8 (40.0%)	χ^2=15.777, df=1, p<0.001
Self-Management Behaviors	14.0 (4.8)	14.2 (5.3)	13.7 (4.2)	MW Z=−0.708, p=0.479
(n=47) mean (SD) Median	Med 13.0	Med 12.0	Med 13.0	
HIV Knowledge Short (18 items)	80.0 (16.0)	83.7 (15.4)	74.7 (15.8)	MW Z=−2.394, p=0.017
Percent Correct mean (SD) Median	Med 88.9	Med 88.9	Med 75.0	

T T-test for Independence; FET Fisher's Exact Test; MW Mann Whitney Test for Independence

Table 4

Risk Reduction Measures: Means (Standard Deviations), Medians, Counts (% to total)

Risk Reduction Measure	Total n=48	MI n=28	HPP n=20	Tests for Group Differences
Number of Sexual Partners [n=44] mean (SD) Median	2.0 (2.0) Med 1.0	1.5 (1.6) Med 1.0	2.8 (2.4) Med 2.0	MW Z=−1.983, p=0.047
Over past 3 mo, Always Used Protection [n=42] n (%)	29 (69.0%)	22 (84.6%)	7 (43.8%)	FET p=0.014
Used Protection Last Sexual Encounter [n=46] n (%)	34 (73.9%	24 (88.9%)	10 (52.6%)	FET p=0.015
Used Protection Last Vaginal Sexual Encounter [n=31] n (%)	27 (87.1%)	21 (100%)	6 (60.0%)	FET p=0.007
In the last 3 mo, I had anal sex n (%) [n=40]	4 (10.0%)	2 (8.7%)	2 (11.8%)	FET p=1.00
Over past 3 mo, decided not to have sex since no protection available [n=42] n (%)	28 (66.7%)	23 (92.0%)	5 (29.4%)	χ^2=17.838, df=1, p<0.001
Last time had sex, under influence of alcohol n (%)	6 (12.5%)	1 (3.6%)	5 (25.0%)	FET p=0.069
Last time had sex, under influence of drugs n (%)	0 (%)	0 (%)	0 (%)	No difference

T T-test for Independence; FET Fisher's Exact Test; MW Mann Whitney Test for Independence