

A stress management intervention for adults living with HIV in Nigerian community settings

An effects study

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Abstract

Background: This study evaluated the effectiveness of a group-based cognitive-behavioral stress management intervention among community-dwelling adults living with HIV in Southeastern Nigeria.

Method: A total of 28 HIV-positive adults meeting the criteria for high perceived stress, anxiety, and depression were randomized into 1 of 2 groups: treatment group (n = 14); and no-treatment control group (n = 14). Stress level was measured using the 10-item Perceived Stress Scale (PSS-10). Depression and anxiety symptoms were assessed using Hospital Anxiety and Depression Scale (HADS). Secondary outcome measure was Satisfaction with Life Scale (SWLS). The intervention was delivered over the course of 10 weeks, using an evidence-based cognitive-behavioral stress management manual. We employed repeated-measures between and within-subjects analysis of variance (ANOVA) and Eta squared in the analyses and interpretation of data collected from the study participants at 3 time points.

Results: Our results showed that, after benefitting from the cognitive behavioral stress management intervention, the PSS-10 and HADS scores were lowered significantly in the treatment group participants than those in the no-treatment control group during evaluations of post-treatment and 3 months follow-up outcomes. Significant improvements were also recorded in the treatment group participants' SWLS scores at post-treatment and follow-up compared with participants in the no-treatment group.

Conclusion: The present results suggest the need for further implementation of group-based cognitive-behavioral stress management interventions for people living with HIV. Cognitive-behavioral stress management clinicians should make efforts toward identifying HIV-positive adults experiencing psychological distress and design cognitive-behavioral stress management interventions in order to better assist them.

Abbreviations: CBT = cognitive behavioral therapy, HIV = human immunodeficiency virus, PSS-10 = Perceived Stress Scale, HADS = Hospital Anxiety and Depression Scale, SWLS = Satisfaction with Life Scale, RAS = Random Allocation Software, η^2 = Eta Squared, ΔR^2 = adjusted *R*-square.

Keywords: adults, anxiety, depression, HIV, Nigeria, perceived stress, satisfaction with life, stress management

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The authors report no conflicts of interest.

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1. Introduction

Stress refers to a condition in which the organism's homeostasis is endangered and/or the organism perceives a situation as being dangerous. Stress among older adults is a growing public health concern across the globe.^[1–5] Over the course of aging, a change in the hypothalamic-pituitary-adrenal axis function may occur, and the altered diurnal or stress-induced secretion of the hormone cortisol might make older people vulnerable to a wide spectrum of negative health outcomes.^[2,6] For instance, high stress has been significantly linked to high depression symptoms and low life satisfaction among older people,^[4] along with accelerated decrease in cognitive function in this adult group.^[7]

The presence of disease conditions could result in depressive feelings, increased stress and anxiety, and poorer satisfaction with life in any person, including in the population of older adults living with a life-threatening disease such as human immunodeficiency virus (HIV).^[8,9] Older adults living with HIV face higher stress levels than younger adults who are HIV-positive.^[1] Although there are numerous evidence-based stress

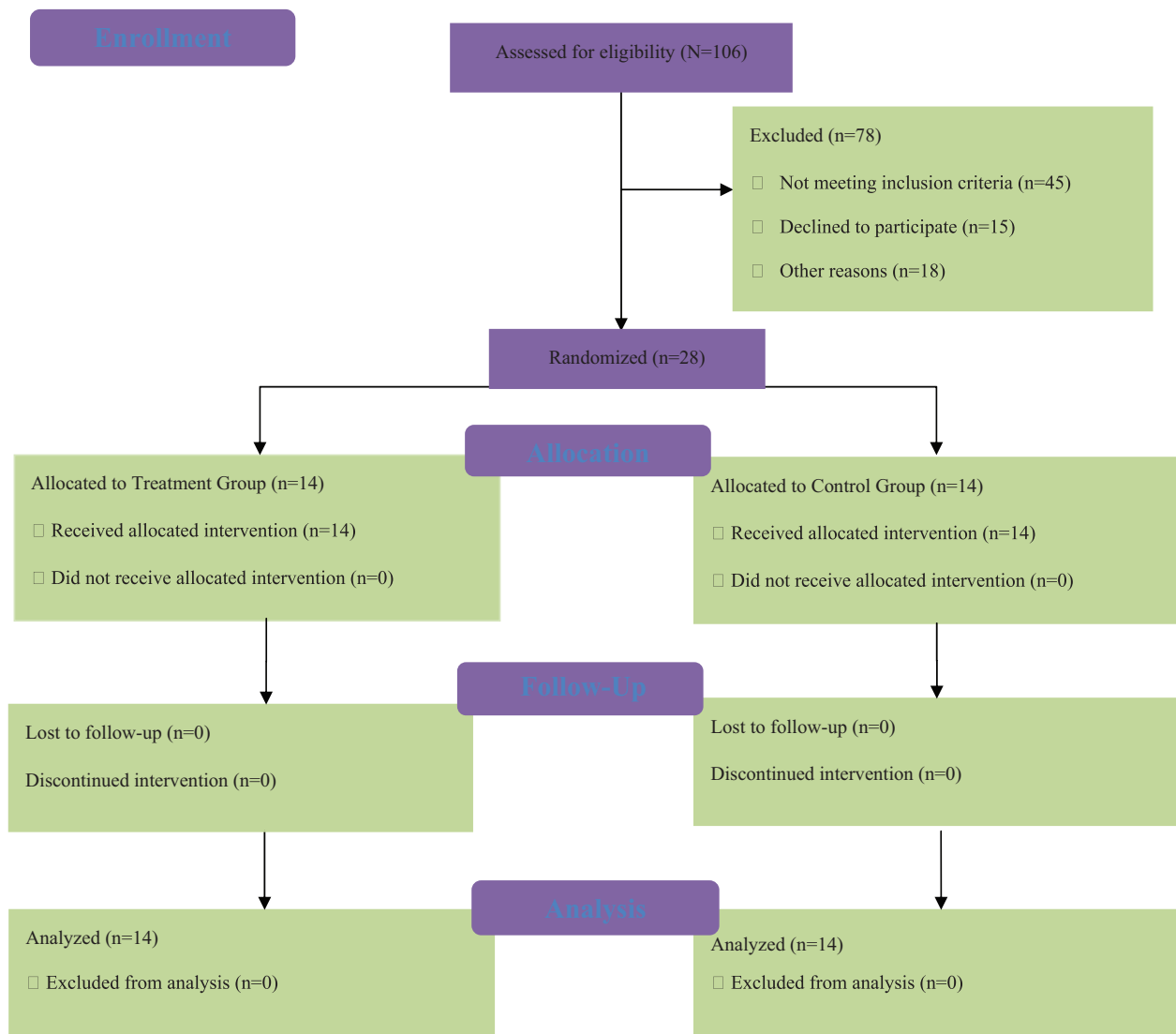


Figure 1. CONSORT flowchart for participant eligibility criteria.

management techniques and/or interventions, a meta-analytic study suggests that cognitive-behavioral interventions can consistently yield larger effects than other kinds of stress management interventions.^[10]

Cognitive-behavioral stress management intervention strategies range from simpler awareness-raising exercises to complex cognitive-behavioral strategies such as cognitive restructuring, coping skills training, anger management, and assertiveness training.^[11] The sequence is not only from simpler to more complex techniques but also from more cognitive activities to behavioral activities, and lastly to interpersonal activities.^[11] The objective of this study is to evaluate the effectiveness of a group-based cognitive-behavioral stress management intervention among community-dwelling adults living with HIV in Southeastern Nigeria.

2. Methods

The study methodology and instruments were reviewed and approved by Departmental Research Ethics Committee at the

authors' institution. The study complied with the ethical requirements as stated in the World Medical Association's Declaration of Helsinki. This study was registered at UMIN Clinical Trials Registry (Trial Registration Number: UMIN000033492). Potential participants filled out and submitted informed consent forms.

To carry out the current study, we accessed 106 adults living with HIV and receiving antiretroviral treatments at various hospitals within the Southeast Nigeria between June and November 2017. Participants' enrolment was carried out by 2 of the researchers alongside 3 research assistants. Potential participants were required to meet certain inclusion criteria such as high-perceived stress, severe anxiety, and depression symptoms. Those who did not meet these criteria were excluded from participating in the study. After meeting eligibility criteria, 28 HIV-positive adults were recruited as study participants (see Fig. 1). Thus, the sample size comprised 28 adults living with HIV. The a priori statistical power of the study sample was 0.80, which showed that the sample size is adequate for the study. The sample size was ascertained by means of a computer software

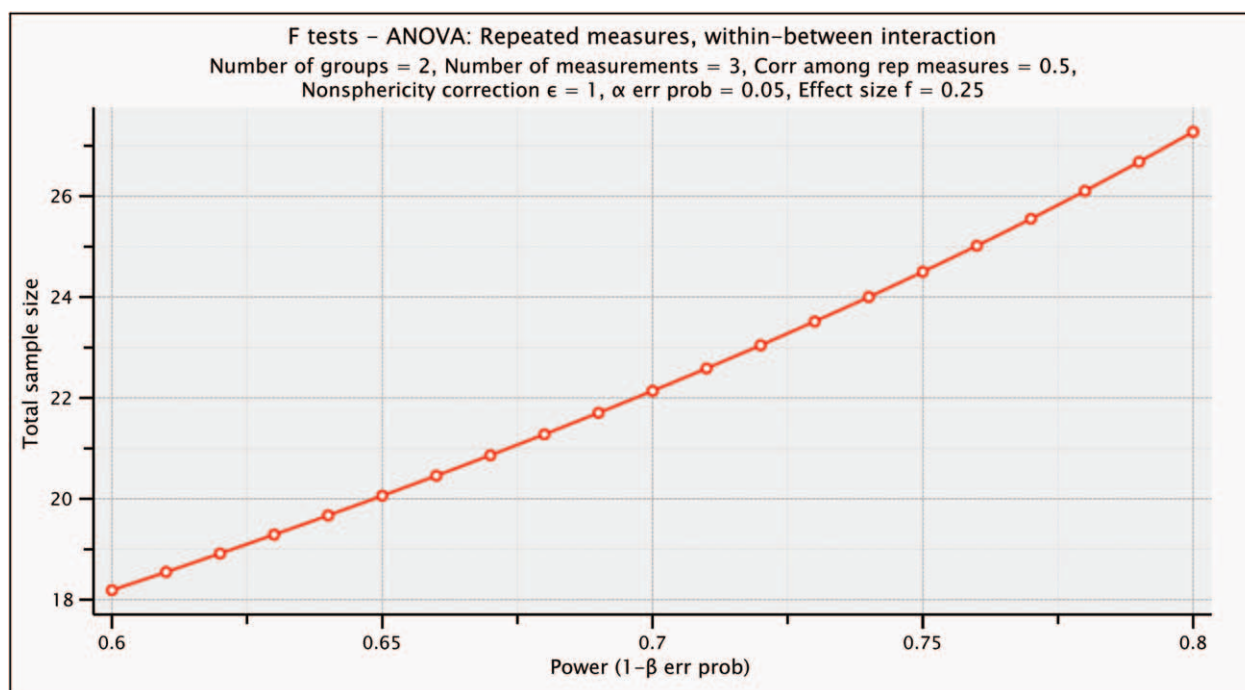


Figure 2. Sample size determination using Gpower computer software program.

program called Gpower, which was developed by Faul et al^[12] (see Fig. 2). The groups were categorized into 2 arms using a group randomized controlled trial design as suggested by clinical trialists^[13]: intervention and no-treatment control groups. A computer software program called Random Allocation Software (RAS)^[14] was used by the researchers to assign participants to 1 of 2 groups: intervention (n=14) and no-treatment control (n=14). This enabled the researchers to carry out the allocation sequence generated using simple randomization based on a randomization table created by the RAS (see Appendix, <http://links.lww.com/MD/C582>). The study participants were blinded to the allocation sequence. The allocation sequence was also concealed from those who assigned the study participants to each intervention type using sealed, opaque envelopes. The intervention was open-label, but data analysts were blinded.

Primary Outcome measures were Perceived Stress Scale (PSS-10)^[15] and Hospital Anxiety and Depression Scale (HADS).^[16] Secondary outcome measure was the Satisfaction with Life Scale (SWLS).^[17] An evidence-based cognitive-behavioral stress management intervention program manual^[11] was adapted and used for the group meetings, supplemented by out-of-session individual activities such as relaxation practice and various self-monitoring exercises.

The group sessions combined the relaxation and stress management sessions into a single 2- to 2.5-hour session held once each week. Each session began with the relaxation training part, followed by a 15-minute break before proceeding to the stress management segment. The program ran for 10 weeks. Before the first group meeting, an optimal location and meeting time for all of those attending the program was established. At that point, the therapists also probed for any prescheduled activities that may preclude a participant's lack of ability to attend certain sessions so that appropriate readings and exercises

from the participants' workbook can be assigned so as to keep the participant in sequence.

Each group session provided the opportunity for practicing a new relaxation technique such as imagery, progressive muscle relaxation, and meditation. Stress management techniques also included cognitive restructuring, coping strategies, and establishing a strong social network. At the end of the intervention, it was expected that participants will be equipped with a range of inter-related methods that they can employ to reduce stress and improve their quality of life.^[18] The therapists who delivered the intervention were those who had training in counseling studies and fieldwork experience in cognitive behavioral interventions. Having sound knowledge of and clinical experiences in cognitive behavioral therapy (CBT) and group therapy were conditions for delivery of the current intervention on part of the therapists.

All participants completed and returned the outcome measures to the researchers upon completion of each time points: Time 1 (pre-treatment: PSS-10, HADS, and SWLS); Time 2 (post-treatment: PSS-10, HADS, and SWLS); and Time 3 (follow-up: PSS-10, HADS, and SWLS). Data collected were analyzed using repeated-measures analysis of variance (ANOVA) within- and between-subjects interactions. All results were considered significant at $P \leq .05$. All analyses were completed with SPSS 22. Screening for missing values and violations of assumptions were carried out. Statistical test for assumptions violation indicated that the Mauchly Test of Sphericity was not significant for PSS-10 data (Mauchly $W=0.511$, $P=.067$), HADS data (Mauchly $W=0.433$, $P=.059$), or SWLS data (Mauchly $=0.198$, $P=.071$). This means that the data sets met the Sphericity assumption. In addition, the test for data normality, which used the Shapiro-Wilk test of normality, was not significant for either group: PSS-10-treatment (Shapiro-Wilk = 0.878, $P=.066$) and control (Shapiro-Wilk = 0.884, $P=.080$);

Table 1
Demographics of the participants.

Variables	Categories	Treatment group (n = 14)%	Control group (n = 14)%	Test statistics	Significance
Gender	Male	5 (41.7%)	7 (58.3%)	0.583 ^x	0.445
	Female	9 (56.2%)	7 (43.8%)		
Location	Urban	7 (53.8%)	6 (46.2%)	0.144 ^x	0.705
	Rural	7 (46.7%)	8 (53.3%)		
Age (Mean, SD)	M ± SD	45.71 ± 3.31	43.57 ± 3.63	1.631 ^t	0.115
Marital status	Single	6 (60.0%)	4 (40.0%)	0.733 ^x	0.693
	Married	5 (41.7%)	7 (58.3%)		
	Widowed	3 (50.0%)	3 (50.0%)		
Employment status	Employed in public service	4 (66.7%)	2 (33.3%)	3.738 ^x	0.291
	Employed in private sector	2 (28.6%)	5 (71.4%)		
	Entrepreneur	5 (71.4%)	2 (28.6%)		
	Unemployed	3 (37.5%)	5 (62.5%)		

Mean age ± standard deviation of participants by group.
n = number of participants; t = t test; x = Chi-square.

HADS-treatment (Shapiro–Wilk = 0.877, *P* = .053) and control (Shapiro–Wilk = 0.879, *P* = .056) and SWLS-treatment (Shapiro–Wilk = 0.920, *P* = .217) and control (Shapiro–Wilk = 0.922, *P* = .237). This showed that the data were normally distributed. No missing values or outliers were found across the data sets for both groups.

3. Results

The mean age of the participants in the treatment group was 45.71 ± 3.31 years compared with 43.57 ± 3.63 years in the no-treatment control group. Out of the 28 adults living with HIV who participated in the study, 5 males (41.7%) and 9 females (56.2%) were in the treatment group compared with 7 males (58.3%) and 7 females (50.0%) in the no-treatment control group. On location, 7 urban (53.8%) and 7 rural (46.2%) were in the treatment group compared with 6 urban (46.7%) and 8 rural (53.3%) in the no-treatment control group. In the marital status category, the participants' composition in the treatment groups was 6 Single (60.0%), 5 Married (41.7%), and 3 Widowed (50.0%); the participants composition in the no-treatment control group was 4 Single (40.0%), 7 Married (58.3%), and 3 Widowed (50.0%). With regard to employment status, there were 4 Employed in the Public Service (66.7%); 2 Employed in the Private Sectors (28.6%); 5 Entrepreneurs (71.4%); and 3 Unemployed (37.5%) in the treatment group compared with 2 Employed in the Public Service (33.3%); 5 Employed in the Private Sectors (71.4%); 2 Entrepreneurs (28.6%); and 5 Unemployed (62.5%) in the no-treatment control group. Demographic data of the participants are presented in Table 1.

The results in Table 2 showed significant main effect of treatment intervention for adults living with HIV in a Nigerian community setting as measured by PSS-10, *F* (1,26) = 928.328, *P* = .000, $\eta^2 = 0.120$, $\Delta R^2 = 0.119$. These results are evidence that treatment condition significantly alleviated the stress level of adults living with HIV in a Nigerian community setting who were assigned to the treatment condition.

The results also showed that the main effect of time (pre-treatment vs. post-treatment) on perceived stress level was significant, *F* (1,26) = 519.479, *P* = .000, $\eta^2 = 0.187$, $\Delta R^2 = 0.186$. The results showed a significant time x group interaction effect for stress level: *F* (1, 26) = 557.506, *P* = .000, $\eta^2 = 0.178$, $\Delta R^2 = 0.177$. Also, the follow-up assessment (Time 3) showed that there was a significant reduction in the level of perceived stress among participants in the treatment group compared with the no-treatment control group, *F* (1,26) = 1651.569, *P* = .000, $\eta^2 = 0.151$, $\Delta R^2 = 0.150$. This implied that the treatment condition significantly sustained the reduction in stress level of adults living with HIV in a Nigerian community setting.

The results in Table 3 showed significant main effects of stress management intervention for adults living with HIV in a Nigerian community setting as measured by HADS, *F* (1,26) = 1600.693, *P* = .000, $\eta^2 = 0.169$, $\Delta R^2 = 0.168$, an indication that treatment intervention significantly alleviated HIV-related anxiety and depression scores of adults living with HIV in a Nigerian community setting who were assigned to the treatment condition. The results also showed that the main effect of time (pre-treatment vs post-treatment) on HIV-related anxiety and depression was significant, *F* (1,26) = 1691.563, *P* = .000, $\eta^2 = 0.328$, $\Delta R^2 = 0.327$. The result also revealed a significant time x group interaction effect for stress level, *F* (1, 26) = 1833.278,

Table 2
Results on stress management intervention for adults living with HIV in Nigerian community setting as measured by PSS-10.

Measure	Assessment	Group	N	M	SD	95% CI	Significance	η^2	
PSS-10	Time 1	Treatment	14	34.00	2.22	32.7189–35.2811	0.430	–0.009	
		Control	14	34.64	2.02	33.4747–33.8110			
	Time 2	Treatment	14	16.00	1.30	15.2489–16.7511	0.000		0.120
		Control	14	34.86	1.91	33.7510–35.9633			
	Time 3	Treatment	14	14.00	1.30	13.2489–14.7511	0.000		0.151
		Control	14	35.07	1.44	34.2404–35.9024			

η^2 = effect size; ΔR^2 = adjusted R-square; CI = confidence interval; M = mean; N = number of respondents; PSS = Perceived Stress Scale; SD = standard deviation.

Table 3
Results on stress management intervention for adults living with HIV in Nigerian community setting as measured by HADS.

Measure	Assessment	Group	N	M	SD	95% CI	Significance	η^2
HADS	Time 1	Treatment	14	38.29	1.33	37.5201–39.0513	0.785	–0.003
		Control	14	37.86	1.23	37.1461–38.5682		
	Time 2	Treatment	14	14.50	1.83	13.4438–15.5562	0.000	0.169
		Control	14	38.36	1.28	37.6196–39.0947		
	Time 3	Treatment	14	12.57	1.69	11.5917–13.5511	0.000	0.204
		Control	14	38.36	1.22	37.6552–39.0591		

η^2 = effect size; ΔR^2 = adjusted R-square; CI = confidence interval; HADS = Hospital Anxiety and Depression Scale; M = mean; N = number of respondents; SD = standard deviation.

$P = .000$, $\eta^2 = .329$, $\Delta R^2 = .328$. Also, the follow-up assessment (Time 3) showed that there was a significant reduction in HIV-related anxiety and depression scores of participants in the treatment group compared with the no-treatment control group, $F(1, 26) = 2136.410$, $P = .000$, $\eta^2 = 0.204$, $\Delta R^2 = 0.203$. This meant that the treatment condition significantly maintained the decrease in HIV-related anxiety and depression scores of participants.

Table 4 summarized that there was no significant difference in the baseline SWLS scores (Time 1) of treatment and control group participants, $F(1, 26) = 1.677$, $P = .207$, $\eta^2 = 0.061$. The results in Table 4 also showed significant main effects of treatment intervention for adults living with HIV in a Nigerian community setting as measured by SWLS, $F(1, 26) = 263.515$, $P = .000$, $\eta^2 = 0.183$, $\Delta R^2 = 0.182$, which was an indication that treatment condition significantly improved the SWLS scores of adults living with HIV in a Nigerian community setting who were assigned to the treatment condition. The results also showed that the main effect of time (pre-treatment vs post-treatment) on SWLS scores of treatment group participants was significant, $F(1, 26) = 343.043$, $P = .000$. The result also revealed a significant time x group interaction effect for SWLS scores, $F(1, 26) = 251.601$, $P = .000$. Also, the follow-up assessment (Time 3) showed that there was a significant improvement in SWLS scores of participants in the treatment group compared with the no-treatment control group, $F(1, 26) = 230.111$, $P = .000$, $\eta^2 = 0.168$, $\Delta R^2 = 0.167$. This implied that the treatment condition significantly improved the SWLS scores of adults living with HIV in a Nigerian community setting.

Figures 3–5 show the interactive effects of time X group in the current study.

4. Discussion

The aim of the present study was to examine the effectiveness of a group-based cognitive-behavioral stress management intervention among community-dwelling adults living with HIV in Southeast Nigeria. It was found that CBT significantly alleviated

the perceived stress, anxiety, and depression symptoms as well as improved the satisfaction with life scores of the community-dwelling adults living with HIV who were randomized to the treatment group compared with patients in the no-treatment control group in Southeast Nigeria. Previous study demonstrated that CBT is an effective intervention in reducing depression, anxiety, and perceived stress.^[19] Jayasvasti et al^[20] reported that cognitive behavioral program is beneficial for treatment of depression among adult HIV-infected patients. CBT is a treatment approach that addresses dysfunctional emotions, maladaptive behaviors, cognitive processes, and contents.^[21] Dixon et al^[22] found that CBT is effective in reducing common mental disorder symptoms in people living with HIV.

Høifødt et al^[23] indicated that CBT-based intervention is effective for treating depression and anxiety disorders. Other researchers demonstrated that CBT was efficacious in the treatment of depression and may provide a viable alternative to antidepressant medications when implemented in a competent fashion.^[24] Cognitive behavioral program could be used as an adjunct to medication treatment for severely depressed patients, as it does appear to have an enduring effect that protects against subsequent relapse and recurrence following the end of active treatment.^[24] Fava et al^[25] reported that CBT was an advanced measure to control and treat depressive conditions. Researchers also indicated that CBT intervention was an effective approach for managing depressive symptoms.^[26]

Ishikawa et al^[27] reported that compared with a no-treatment group, the effects of CBT for patients with anxiety disorders were more meaningful.^[24] It has been shown that the majority of individuals with anxiety disorders treated with CBT experience substantial benefits.^[27] A study found that there was a significant reduction of mean anxiety and depression in the experimental group when compared with the control group with the application of CBT.^[28] Researchers showed that CBT significantly reduced the mean scores of anxiety and depression in its beneficiaries.^[29] Researchers reported that application of CBT showed an adjusted difference in anxiety.^[30,31]

Table 4
Results on stress management intervention for adults living with HIV in Nigerian community setting as measured by SWLS.

Measure	Assessment	Group	N	M	SD	95% CI	Significance	η^2
SWLS	Time 1	Treatment	14	5.71	0.47	5.394–6.035	0.207	0.061
		Control	14	6.00	0.69	5.679–6.321		
	Time 2	Treatment	14	18.64	2.65	17.1134–20.1723	0.000	0.183
		Control	14	6.57	0.85	6.0797–7.0631		
	Time 3	Treatment	14	18.64	2.73	17.0639–20.2218	0.000	0.168
		Control	14	7.00	0.88	6.4936–7.5064		

η^2 = effect size; ΔR^2 = adjusted R-square; CI = confidence interval; M = mean; N = number of respondents; SD = standard deviation; SWLS = Satisfaction with Life Scale.

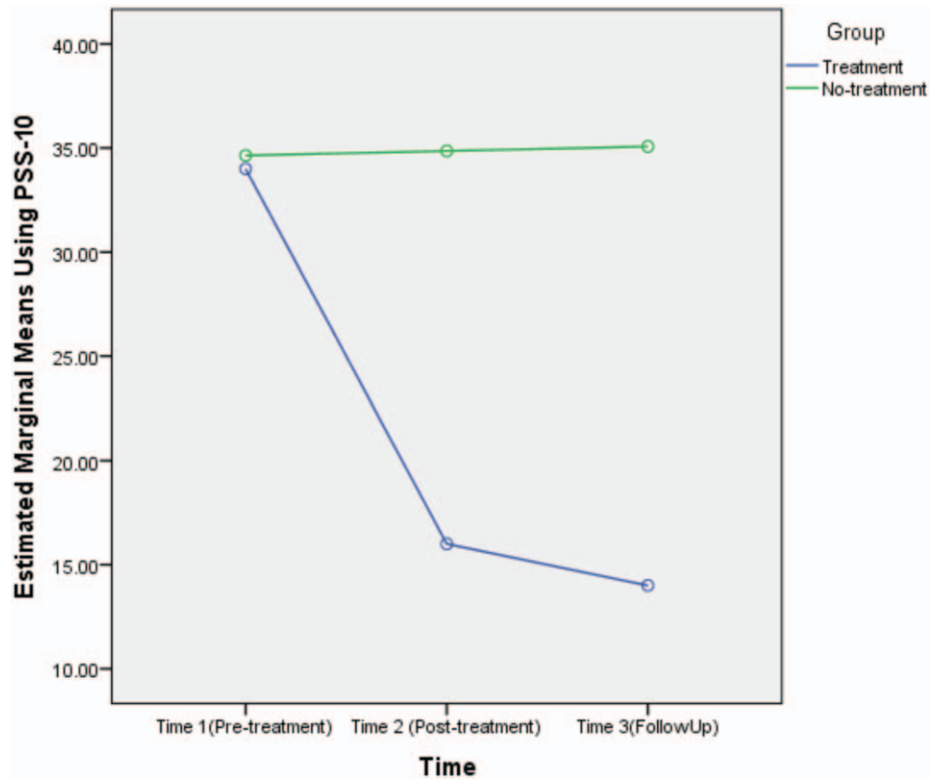


Figure 3. Effect of stress management intervention for adults living with HIV in Nigerian community setting as measured by PSS-10.

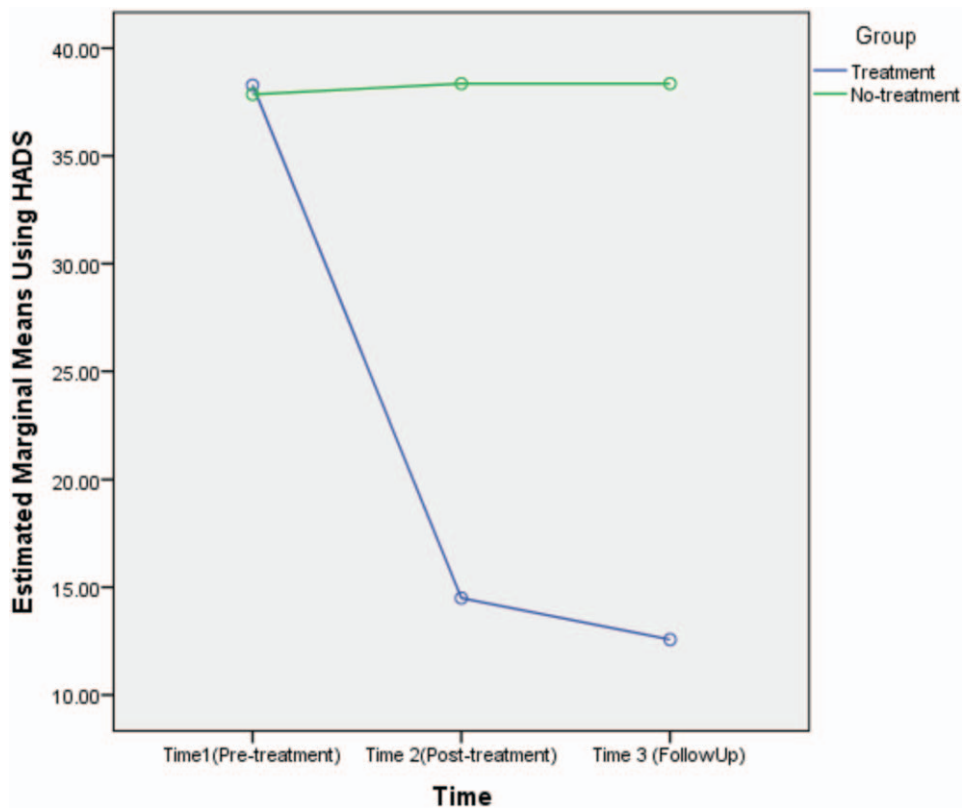


Figure 4. Effect of stress management intervention for adults living with HIV in Nigerian community setting as measured by HADS.

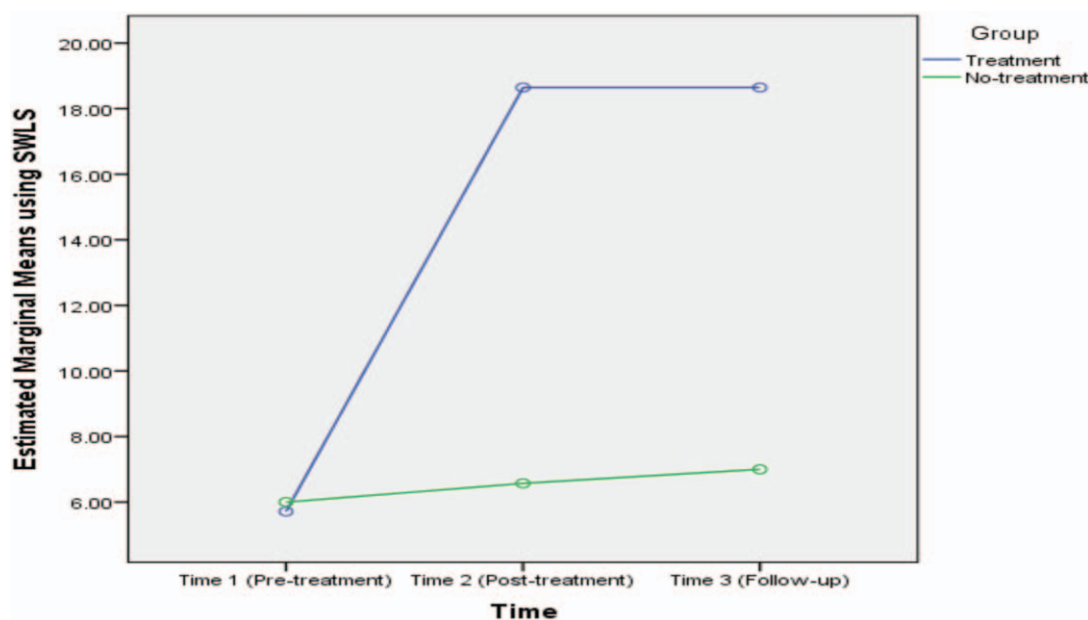


Figure 5. Effect of stress management intervention for adults living with HIV in Nigerian community setting as measured by SWLS.

Meta-analyses showed that CBT is effective for managing anxiety and depression symptoms in primary care settings.^[32] CBT that target anxiety and depression can generate therapeutic effects.^[33] Hsieh et al reported that CBT is a positive treatment for treating anxiety symptoms.^[34] Researchers found that CBT can improve quality of life and anxiety levels compared with usual care.^[35] Previous study reported that CBT significantly improved the mean scores of specific-stress symptoms among its beneficiaries.^[30]

CBT is shown to be an effective measure for improving life satisfaction among anxious and depressive patients living with HIV. In this respect, Terides et al reported that CBT was a useful therapy for dealing with clinical and subclinical symptoms of depression and general anxiety and can increase life satisfaction.^[36] Patients' practice of CBT skills is a core aspect of treatment for anxiety and depression, which invariably results in life satisfaction.^[36] Ninety-six percent of beneficiaries reported satisfaction with CBT.^[37] Higher levels of overall satisfaction and perceived benefit from CBT can be associated with positive therapy expectations, positive ratings of therapist's personal characteristics, competence and trustworthiness, lower pre-therapy depression, and improvements in quality of life.^[37] Participants reported higher life satisfaction at the end of a previous study.^[38] Hofmann et al^[39] found that CBT for anxiety disorders is moderately effective for improving quality of life, especially in physical and psychological domains. The application of CBT resulted in significant improvements in the achievement and social functioning factors of patients.^[40] Adherence to CBT can result in an overall treatment satisfaction, reduction of depression and anxiety symptoms, and sustained positive gains in life satisfaction.^[41]

Regardless of the above supports for our study results, the study was not without some shortcomings. The study's sample size included only community-dwelling adults living with HIV in Southeast Nigeria. This means that the participant pool was limited and future studies might expand to broader population. Furthermore, the effectiveness of the CBT program was assessed

using only 3 self-rating scales, which provided quantitative information. In prospective research, researchers may adopt interview and focus group discussion in order to understand HIV patients' lived experiences with respect to stress, anxiety, depression, and life satisfaction. Another shortcoming of the study was that while participants of the CBT intervention program had a highly structured and specialized social interaction, it was not the same for the control group. Future research can use alternative comparison group such as treatment-control group or waitlisted control group so as to overcome any shortcoming related to the use of no-treatment control group.

5. Conclusion

The findings of this study suggest the need for further implementation of group-based cognitive-behavioral stress management interventions for adults living with HIV in Nigerian community settings. Cognitive-behavioral stress management clinicians should make more effort toward identifying HIV-positive adults experiencing psychological distress and design cognitive-behavioral stress management interventions in order to better assist them.

Author contributions

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