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Effect of Behavioural Therapy on Depression in Adolescents with Sickle Cell Disease

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Abstract

Background: Depression, one of the commonest mental health problems in SCD, has high prevalence rates. While psychological therapies have been found to be beneficial in mild to moderate depression, their use as non-pharmacological methods amongst adolescents in sub-Saharan Africa, particularly Nigeria, is still at its infancy. **Objective:** To determine the effect of behavioural activation therapy on depression in adolescents living with Sickle Cell Disease attending out-patient clinic at the Lagos State University Teaching Hospital, Lagos, Nigeria. **Method:** The study was conducted in Lagos State University Teaching Hospital, Lagos, Nigeria, between November 2017 to February 2018 (4 months) among adolescents living with SCD and depression attending out-patient clinic. A randomized control trial (RCT) was conducted among participants assigned to treatment (30) versus control (30) group. A manualized behavioral therapy programme developed was delivered to the treatment group. The data was analysed using the Statistical Package for Social Sciences (SPSS) version 23. Pair T-test was used to compare the two groups across continuous variables, pre- and post intervention. Analysis of Covariance (ANCOVA) was used to determine treatment effects controlling for baseline scores. **Result:** After the intervention, the mean depression score reduced from 22.13 ± 3.08 to 13.02 ± 4.56 while Paediatric quality of life score increase from 62.57 ± 17.85 to 67.90 ± 7.99 in the treatment group (BDI, $p < 0.001$; PedsQL, $p = 0.045$). However, the pre- and post-intervention mean depression scores in the control group showed insignificant reduction from 22.23 ± 3.24 to 21.60 ± 2.75 and mean PedsQL from pre-intervention scores of 59.67 ± 12.60 to 56.73 ± 8.94 post intervention (BDI, $p = 0.388$; PedsQL, $p = 0.242$). From multivariate analysis (ANCOVA), only the Quality of Life scores ceased to show any significant effect of the intervention. **Conclusion:** This study further strengthens and supports the extant literature that behavioral therapy alone is efficacious for depressive.

Keywords

Behavioral Therapy, Depression, Adolescent, Sickle Cell Disease, RCT

1. Introduction

Sickle cell diseases (SCD) constitute a global health problem [1] with high burden of disease worldwide. The heamoglobinopathy is a public health problem with approximately 300,000 affected infants born worldwide every year [2]. However, it is particularly common amongst those from sub-Saharan Africa, Mediterranean countries and Saudi Arabia, with more than half of global cases in Africa [1]. In the year 2010, Nigeria, Congo and Democratic Republic of Congo accounted for 57% of new born with SCD. The projection for the year 2050 revealed that Nigeria's contribution to incidence would increase from 30% to 35%, which translates to 91,000 annual births in 2010 to approximately 140,800 by 2050 [3]. The currently high and the projected increased burden are thought to be due to inadequate screening and genetic counseling services [4]. Furthermore, the level of care for patients with SCD is still sub optimal in the country [4] making the consequences more serious. Poor treatment options and affordability of the sub-optimal treatment also contributes to the chronicity of the disorder. Like other chronic disorders, SCDs are often associated with physical and psychosocial problems either due to organic dysfunctions or a reaction to the disorder [5]. Several psychosocial correlates have been identified to occur with sickle cell diseases such as depression, anxiety and low self-esteem [6]. Depression has been identified as one of the commonest mental-health problems in SCD, with prevalence rates as high as 27% - 46% reported [7]. Persons with SCD have also been reported to be at greater risk of depression compared with the general population [8]. Several factors have been identified with episodes of depression in sickle cell disease which includes pain, and other psychosocial correlates. The onset of depression, either in SCD or the general population, is often during adolescence or runs a chronic recurrent course [9].

Non pharmacological therapies such as psychological therapies have been found to be beneficial in treatment of depression especially when the degree of severity is mild or moderate. In fact, psychological therapies are considered first line in management of depression in the adolescent age group [10]. These psychological therapies include behavioral therapy and cognitive-behavioral therapy. Despite the success of psychological therapies in adolescent depression, very few studies have used and demonstrated how effective the use of psychological therapies are among adolescents in sub-Saharan Africa [11] [12]. The limited use of psychological therapies in sub-Saharan Africa is multifactorial. Aside the constrained public mental-health resources and limited number and training of practitioners; users have had to discontinue psychological therapies for reason of the logistic and financial constraints of attending multiple sessions [13]. The use of

shorter, cheaper, and easy to administer psychological therapies has, therefore, been advocated for such regions like sub-Saharan Africa [13]. It is thought that such will be more user-friendly and easier to scale. Behavioral Activation Therapy (BAT) is a form of Psychological therapy which is less complex, shorter, and invariably cheaper than other forms of therapies. It has been found to be of benefit in depressive symptoms among adolescents in sub-Saharan African population [13]. Behavioral Activation Therapy provides a potential opportunity to address the high burden of depression in SCD clinics in resource constrained settings such as Nigeria. This is because BAT may provide a cheap, short, and easy to deliver alternatives to other therapies such as cognitive-behavioral therapy in countries like Nigeria with a high burden of SCD and limited resources to respond to the mental-health impact of the disease. The fact that BAT is less complex and easily administered also means that it can be easily up scaled to be delivered by non-specialist health workers, if found effective. This study, therefore, aimed to determine the effect of Behavioral Activation Therapy on depression among adolescents with sickle cell disease in a tertiary SCD clinic in Lagos, Nigeria.

2. Methodology

2.1. Setting

The study was conducted at the paediatric SCD clinic of the Lagos State University Teaching Hospital, Ikeja, Lagos (LASUTH) between November 2017 to February 2018 (4 months). This clinic attends to adolescents aged 12 - 17 years with SCD.

2.2. Participants

The participants were a sample of consenting adolescents (12 - 17 years) with SCD who had mild to moderate depression.We excluded those with severe depression on anti-depressant medications. The participants were divided into two groups, the treatment group and wait list (control) group. The minimum participants included in the intervention study was calculated using the formula from Wade, 1999 [14], a mean effect size of 0.80 was hypothesised. For an unpaired t-test to detect this difference with a power 0.80 and a desired significance of 0.05, a minimum of 25 participants would be needed in each group.

2.3. Instruments

Socio-Demographic Questionnaire: This questionnaire was designed to obtain socio demographic information such as age, gender, socio-economic ratings in the adolescents. Their medical background was also obtained including genotype, haemogobin levels, frequency of hospital admissions in the past year, and regular medications taken.

Mini International Neuropsychiatry Inventory Kid (MINI-kid): is a structured interview for psychiatric evaluation in making diagnosis of psychiatry disorders in children and adolescents. It has been widely used to diagnose depression

in community-based studies in adolescents. It has been used for studies among adolescents in Nigeria [15] [16] [17] and it takes about 15 minutes to complete.

Beck Depression Inventory-II (BDI-II): BDI-II is a self-rating 21 item inventory which measures the presence and severity of depressive symptoms. Each item on BDI is scored on a four point scale of 0 - 3, the higher the scores, the higher the severity of depressive symptoms. Scores of 0 - 13 are considered as minimal depression, 14 - 19 mild depression, 20 - 28 moderate depression and 29 - 63 severe depression. The BDI has been widely used and validated amongst adult population in Nigeria and has also been used and validated amongst adolescents within ages of 13 - 18 in Nigeria [18] with a cut off score of 18.

Pediatric Quality of Life (PedsQL): The PedsQL is a 23-item scale for measuring health related quality of life and is designed for children and adolescents between ages 8 and 18 years. The instrument encompasses 4 sub scales which include physical functioning with 8 items, emotional functioning with 5 items, social functioning with 5 items and school functioning with 5 items. The physical health summary score includes the 8 items under the physical functioning scales while the psychosocial health summary score includes 15 items combined in emotional, school and social functioning scores. The instrument requires about 5 minutes to be administered and has been used in Nigeria [19].

All questionnaire and instruments were administered by the author and two other trained interviewers. The participants were all informed about the aims and objectives of the research, both verbal and written consent were properly obtained in the out-patient clinic during follow-ups. Following this, participants who had been confirmed by MINI-Kid depression had BDI-II administered for severity and those who had severe depression scores (BDI-II > 29) were offered support.

2.4. The Intervention

A manualized behavioural therapy programme developed by the authors was delivered. The programme consists of 5 structured weekly sessions each lasting 45 - 60 minutes. The sessions were delivered in groups of 2 - 5 participants. The first session focused on psycho-education on causes, symptoms and treatment of depression. The link between cognitions, emotions and behaviour was explained and participants were taught a simple cognitive technique to generate and use positive self-talk. The latter technique includes religious-based coping self-talk, which is commonly used in the local population (e.g. counting your blessings). Also, local metaphors and analogies such as "however dark the night might be, a sunrise will eventually come" was used to promote hope. The second session explained the rationale for behavioural activation. Participants were taught to identify pleasurable activities and avoidant activities as well as how to monitor their mood. In the third session, more pleasurable activities were identified and participants were encouraged to have a list of pleasurable activities to carry out daily. The fourth session focused on relaxation techniques and participants were taught muscle

relaxation, deep slow breathing exercises and positive imagery. This session also discussed psychosocial strategies for pain management. The fifth session was a revision of the preceding sessions and techniques. Two randomly selected sessions were audio-recorded and assessed by the manual author to confirm good adherence to the manual. Participants in the wait-list (control) group were monitored weekly for severity of depressive symptoms via telephone calls. Safety netting advices were given to guardians. Following this, Behavioral Activation Therapy was administered over a 5-week period. However, results of intervention for the wait-list (control) group are not included in this study.

2.5. Procedure

As shown in **Figure 1**, the study design was multi staged. The first stage involved the use of MINI-kid to screen for depression among adolescents with SCD. The second stage involved the use of the BDI instrument to assess the dimensional severity of depression among those that screened positive for depression on MINI-Kid. Those who had BDI scores between 19 and 29 (which correspond to mild-moderate depression) were moved to the third stage of the study. Those with scores above 29 (severe depression) were excluded from the study. In the third stage, the adolescents who met inclusion criteria of BDI scores between 19 and 29 were randomly divided into two equal groups: the intervention group and the waiting-list control. Assignment to treatment or control group was by stratified dyadic matching by a senior academic unconnected with the study. The intervention was administered to the included adolescents (BDI scores from 19 - 29) who scored above the cut-off for clinically significant depression starting with the intervention group. About 230 participants were screened for depression and 30 participants were recruited into each study groups.

2.6. Data Analysis

The data was analysed using the Statistical Package for Social Sciences (SPSS) version 23. The results were presented in frequency tables, means, standard deviation and descriptive analysis. Chi square analysis was used to compare the groups on categorical variables. Independent sample T-test was used to compare the two groups across continuous variables such as depression scores (pre- and post-intervention) and quality of life scores (pre- and post-intervention). Analysis of Covariance (ANCOVA) was used to determine treatment effects controlling for baseline scores.

2.7. Ethical Considerations

All participants were informed about the aims and objectives of the study, and then verbal and written consent were properly obtained. Following parental consent, assenting adolescents who had sickle cell were recruited. Ethical approval was obtained from Research and Ethics Committee of the Lagos State University Teaching Hospital, Ikeja, Lagos.

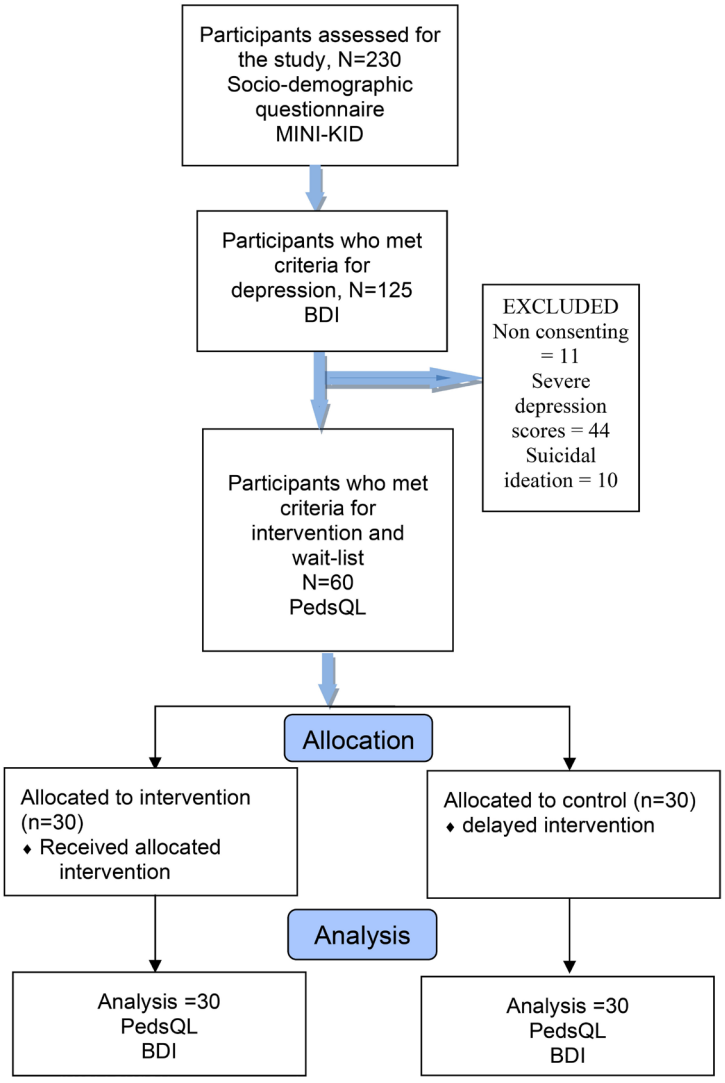

Figure 1. Work flow of the research procedure.

3. Result

3.1. Socio-Demographic and Clinical Characteristics Description of Study Participants

A total of 230 adolescents respondents living with SCD were screened for the presence of Major Depressive Episode (MDE) using MINI kid. Out the people screened, 30 adolescents were selected into treatment group and 30 adolescent were selected into control group. Socio-demographics of respondents are presented in Table 1 and Table 2 below. The two groups were similar in their socio-demographic and clinical characteristics except for the marital status of their parents and the number of crisis they have had. As shown in Table 1, parents of participants in the control group were more likely to be married ($\chi^2 = 6.667$, df = 1, p = 0.010) while Table 2 shows that participants in the treatment group were more likely to have had crises ($\chi^2 = 12.839$, df = 2, p = 0.003). These outcomes further confirmed age and sex matching in treatment and control group.

Table 1. Socio-demographic characteristics of treatment and control group.

Variables	Treatment Group (n = 30)	Control Group (n = 30)	t-test or χ^2	p value
Age (M, SD)	13.63 (1.97)	13.70 (1.82)	0.136	0.892
Gender				
Male	16 (53.3)	16 (53.3)	0.000	1.000
Female	14 (46.7)	14 (46.7)		
Education				
Primary	2 (6.7)	5 (16.7)	3.180	0.202
Secondary	19 (63.3)	21 (70.0)		
Tertiary	9 (30.0)	4 (13.3)		
Religion				
Christianity	26 (86.7)	23 (76.7)	1.002	0.317
Islam	4 (13.3)	7 (23.3)		
Tribe				
Hausa	3 (10.0)	1 (3.3)		
Yoruba	23 (76.7)	24 (80.0)	3.544	0.328
Igbo	1 (3.3)	4 (13.3)		
Others	3 (10.0)	1 (3.3)		
Family type				
Monogamous	24 (80.0)	27 (90.0)	1.176	0.236
Polygamous	6 (20.0)	3 (10.0)		
Marital Status (of parents)				
Married	20 (66.7)	28 (93.3)	6.667	**0.010***
Others(separated & orphan)	10 (33.3)	2 (6.7)		
Fathers Education				
Primary	2 (6.7)	1 (3.3)		
Secondary	18 (60.0)	10 (33.3)	5.979	0.085
Tertiary	8 (26.7)	17 (56.7)		
None	2 (6.7)	2 (6.7)		
Mothers Education				
Primary	2 (6.7)	1 (3.3)		
Secondary	20 (66.7)	16 (53.3)	2.380	0.589
Tertiary	7 (23.3)	12 (40.0)		
None	1 (3.3)	1 (3.3)		

p-value < 0.05 is significant for this analysis.

3.2. Between-Group Differences of Baseline Scores on Measured Outcomes

As shown in Table 3 there were no statistically significant differences in clinical characteristics between the two groups (treatment and control) in both depressive symptom scores and quality of life scores (t = −0.122, df = 58, p = 0.903 and t = 0.727, df = 58, 0.470 respectively).

3.3. Within-Group Differences of Pre- and Post-Outcome Measured Scores

Within-group analysis showed that there was a reduction at post intervention in the two groups on both BDI and PedsQL score measures (as shown in Table 4). Only the treatment group, however, showed statistically significant differences in the mean pre- and post-intervention BDI scores, ($t = 7.895$, $df = 29$, $p < 0.001$). There was, however, no statistically significant difference in the quality of life scores in the treatment group even though scores were comparatively higher post intervention. The control group did not show any statistical difference within the group following assessment after 5 weeks on both BDI and PedsQL measures.

Table 2. Number of crisis in past one year in treatment and control group.

Variables	Treatment Group (n = 30)	Control Group (n = 30)	Fisher's exact	p value
Number of crisis in past one year			12.839	**0.003***
None	0 (0.0)	4 (13.3)		
Once	4 (13.3)	12 (40.0)		
Twice	11 (36.7)	9 (30.0)		
More than twice	15 (50.0)	5 (16.7)		

p-value < 0.05 is significant for this analysis.

Table 3. Baseline depression and Paediatric Quality of Life Score of treatment and control groups.

Variables	Treatment, n = 30 Mean (SD)	Control, n = 30 Mean (SD)	t-Statistics df	p value
BDI Score	22.13 (3.08)	22.23 (3.24)	−0.122 58	0.903
PedsQL Score	62.57(17.85)	59.67 (12.60)	0.727 58	0.470

p-value < 0.05 is significant for this analysis.

Table 4. Impact of the intervention on depression and quality of life within treatment and control group.

Variable	Pre-intervention Mean (SD)	Post-intervention Mean (SD)	t-statistics	df	p value	Mean difference	95% CI
Treatment (n = 30)							
BDI Score	22.13 (3.08)	13.20 (4.56)	7.895	29	<0.001*	−8.93	6.61 - 11.25
PedsQL	62.57 (17.85)	67.90 (7.99)	−1.664	29	0.107	5.33	−11.89 - 1.22
Control (n = 30)							
BDI Score	22.23 (3.24)	21.60 (2.75)	0.876	29	0.388	−0.63	−0.85 - 2.11
PedsQL	59.67 (12.60)	56.73 (8.94)	1.1195	29	0.242	−2.93	−2.08 - 7.96

p-value < 0.05 is significant for this analysis.

3.4. Between-Group Mean Differences in Pre- and Post-Intervention Scores

Post intervention mean differences on measured outcome variables between treatment and control group are presented in Table 5. There were statistically significant differences on all measured variable scores; BDI and PedsQL between the two groups (BDI treatment = −8.93, BDI control = −0.63; t = 6.18, df = 58, p < 0.001), (PedsQL treatment = 5.33, PedsQl control = −2.93; t = −2.05, df = 58, p < 0.0045). Hence, null hypothesis rejected for both depression scores and health related quality of life.

3.5. Test of Treatment Effects

One way Analysis of Covariance (ANCOVA) was used to determine the effect of intervention on depressive symptoms (BDI scores) and quality of life (PedsQL). Age, gender, class, religion, ethnicity, family types were not included in these ANCOVAs as these variables did not differ significantly between the groups.

Test of Effects between Participants Effects on BDI and PedsQL

The effects of the intervention on BDI scores are shown in Table 6. The first model used post intervention BDI scores as the dependent variable while the study group was used as the independent variable (fixed factor). The pre-intervention BDI scores were included in the analysis as a covariate while the number of time crisis and marital status were controlled as they were significantly different between the intervention and control group. There was a significant treatment effect of the intervention on depressive symptoms measured by BDI {F (1.47) = 13.03, p = 0.001}. The intervention explained 21.7% of the variance in the post-intervention BDI scores. The intervention had a large effect size (Cohen's *d*) of 2.1 using the calculation Cohen's $d = (X_1 - X_2)/s$ (where X_1 is the mean post intervention BDI score of the treatment group; X_2 is the mean post intervention BDI score of the control group, and "s" is the pooled standard deviation of the two groups). Similar to the first model, in the second model, post intervention PedsQL was used as the dependent variable, the treatment group was entered as a fixed factor being the independent variable. The pre-intervention PedsQL scores were included in the analysis as covariate while number of crisis and marital status were also controlled for as there were significant differences between the intervention and control groups. There was no significant treatment effect of the intervention on quality of life as measured by PedsQL {F (1.47) = 0.35, p = 0.557} (Table 7).

Table 5. Impact of the intervention on depression and quality of life between treatment and control group (mean differences).

Variables	Treatment, n = 30 Mean (SD)	Control, n = 30 Mean (SD)	t-statistic	Df	p value
BDI Score	−8.93 (6.20)	−0.633 (3.96)	6.18	58	<0.001*
PedsQL Score	5.33 (17.56)	−2.93 (13.45)	−2.05	58	0.045*

p-value < 0.05 is significant for this analysis.

Table 6. Treatment effect based on ANCOVA controlling for baseline BDI score, number of crises per annum and marital status of parent on depression using ANCOVA.

Source	Type III Sum of Squares	Df	Mean Square	F	Sig.	Partial Eta Squared
Corrected Model	1212.496[a]	12	101.041	7.110	<0.001	0.645
Intercept	480.192	1	480.192	33.791	<0.001	0.418
BDI pre	22.664	1	22.664	1.595	0.213	0.033
GROUP	185.172	1	185.172	13.030	0.001	0.217
MARITAL	11.448	1	11.448	0.806	0.374	0.017
Number of Crisis	11.466	3	3.822	0.269	0.847	0.017
GROUP * MARITAL	5.990	1	5.990	0.422	0.519	0.009
GROUP * Number of Crisis	1.120	2	0.560	0.039	0.961	0.002
MARITAL * Number of Crisis	30.748	3	10.249	0.721	0.544	0.044
GROUP * MARITAL * Number of Crisis	0.000	0				<0.001
Error	667.904	47	14.211			
Total	20,046.000	60				
Corrected Total	1880.400	59				

a. R Squared = 0.645 (Adjusted R Squared = 0.554); p-value < 0.05 is significant for this analysis.

Table 7. Impact treatment effect, number of crises per annum and marital status of parent on quality of life using ANCOVA.

Source	Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared
Corrected Model	2639.185[a]	12	219.932	3.039	0.003	0.437
Intercept	7716.970	1	7716.970	106.619	<0.001	0.694
PedsQL	288.495	1	288.495	3.986	0.052	0.078
GROUP	25.348	1	25.348	0.350	0.557	0.007
MARITAL	39.580	1	39.580	0.547	0.463	0.012
Number of Crisis	176.389	3	58.796	0.812	0.493	0.049
GROUP * MARITAL	123.876	1	123.876	1.712	0.197	0.035
GROUP * Number of Crisis	94.617	2	47.309	0.654	0.525	0.027
MARITAL * Number of Crisis	91.243	3	30.414	0.420	0.739	0.026
GROUP * MARITAL * Number of Crisis	0.000	0				0.000
Error	3401.798	47	72.379			
Total	239,043.000	60				
Corrected Total	6040.983	59				

a. R Squared = 0.437 (Adjusted R Squared = 0.293); p-value < 0.05 is significant for this analysis.

4. Discussion

Behavioral therapy was introduced to adolescents with SCD who had depressive symptoms on the basis of its efficacy in studies of depressed adolescents who do not have SCD. Following intervention, adolescents with SCD (with mild to moderate depression) in the treatment group showed significant improvements in their depressive symptoms (lower BDI score) compared to control group after 5 weeks, a finding consistent with previous studies with adolescents and adults

[20] [21] [22]. In other words, the findings showed that adolescents who received behavioral activation intervention had statistically significant reduction in depressive symptoms compared with the waitlist control group. Symptomatic relief of depressive symptoms suggests evidence of efficacy of the intervention in this cohort. In addition, the short-term nature of the treatment used in this study, marks an important difference between it and other psychotherapy intervention studies for adolescents in Africa. Therefore, the main outcomes of this work support the extant literature that BAT is an efficacious therapy for depressive symptoms among adolescents with depression and now extended to those with SCD and depression. Furthermore, this research indicates that the use of behavioral activation strategies alone may be sufficient to lead to behavioral and cognitive changes that significantly reduce depressive symptoms among adolescents who live with SCD. These conclusions are derived on the basis of between-group differences, which showed that though both treatment and waitlist groups started out at comparable mean levels of depressive symptoms, BAT reduces depressive symptoms in treatment group.

Having reviewed the findings from this work, the clinical effectiveness of BAT in the significant reduction of depressive symptoms among adolescents with SCD is further strengthened.

This present study yielded a large effect size of 2.1 in five sessions which can be attributed to the intervention. This is comparable and indeed higher than the mean effect size of 0.87 (95% Confidence Interval 0.6 - 1.15) reported in a meta-analysis of studies which compared the effect of a behavioral activation group to a control group [23].

This study, by demonstrating the efficacy of BAT in adolescents with SCD who have depressive symptoms, is therefore in support of the use of BAT alone for adolescents with SCD who have depression. In other words, the findings show that in and of itself, BAT could be an effective treatment for depressive symptoms in adolescents with SCD and therefore support these theoretical underpinnings and challenges what cognitive therapists could have said previously about the mechanisms of action in CBT for depression in adolescents in general and particularly among those with SCD. More so, BAT is less complex than other forms of therapies; easier to understand compared with cognitive strategies [20] and can be as effective as cognitive interventions for depression [23] especially for young people [24]. A significant Nigerian study has reported the benefit of BAT for depressive symptoms among adolescents in Nigeria [13]. This line of reasoning supports the usefulness of BAT particularly in resource poor countries like Nigeria and helps explain why BAT may stand alone as an efficacious treatment intervention for depression among adolescents who live with SCD.

An important negative finding of the present study is the observation that though quality of life was statistically significant in post-intervention bivariate analysis; it ceased to be so after the ANCOVA. Unfortunately, though an important measure of wellness, recent review of randomized control trials which have assessed the impact of BAT on adolescent depression showed that quality of life

measures has not been included as outcome measure in most trials [19]. As such, it is difficult to put this particular finding of the present study in context. However, the disappearance of the apparent positive effect of BAT on QoL after multi-variate analysis may be an example of Type II error due to the small sample size. There is need for more research, especially highly powered studies with larger sample sizes, to further explore the impact of BAT on QoL of adolescents beyond symptom reduction. This is because QoL measures are not only useful in tracking treatment outcomes; they also provide reliable information about the impact of specific treatments on well-being and functioning [25].

In conclusion this study aimed to determine the effect of behavioral activation therapy (BAT) in adolescents with SCD and mild to moderate depression using a randomized controlled trial. The results showed that BAT resulted in significant improvements in self-reported rating of depressive symptoms (effect size 2.1) and depression literacy suggesting efficacy of BAT in alleviating depressive symptoms in this cohort, however the QoL scores initially appeared to have had a positive change but ceased to be so after controlling for possible confounders. In the background of knowledge of scarcity of psychological therapies in Sub-Saharan Africa, and BAT relatively being cheap and easy to administer, this intervention could be a turnaround as concerns delivery of psychological therapies in Sub-Saharan Africa.

Conflicts of Interest

The authors declare no conflicts of interest regarding the publication of this paper.

References

[1] World Health Organization (2008) The Global Burden of Disease: 2004 Update. World Health Organization, Geneva. http://www.who.int/healthinfo/global_burden_disease/GBD_report_2004update_full.pdf

[2] Williams, T.N. and Weatherall, D.J. (2012) World Distribution, Population Genetics, and Health Burden of the Hemoglobinopathies. *Cold Spring Harbor Perspectives in Medicine*, **2**, a011692. https://doi.org/10.1101/cshperspect.a011692

[3] Piel, F.B., Patil, A.P., Howes, R.E., Nyangiri, O.A., Gething, P.W., Dewi, M., Temperley, W.H., Williams, T.N., Weatherall, D.J. and Hay, S.I. (2013) Global Epidemiology of Sickle Haemoglobin in Neonates: A Contemporary Geostatistical Model-Based Map and Population Estimates. *The Lancet*, **381**, 142-151. https://doi.org/10.1016/S0140-6736(12)61229-X

[4] Galadanci, N., Wudil, B.J., Balogun, T.M., Ogunrinde, G.O., Akinsulie, A., Hasan-Hanga, F., Mohammed, A.S., Kehinde, M.O., Olaniyi, J.A., Diaku-Akinwumi, I.N., Brown, B.J., Adeleke, S., Nnodu, O.E., Emodi, I., Ahmed, S., Osegbue, A.O., Akinola, N., Opara, H.I., Adegoke, S.A., Aneke, J. and Adekile, A.D. (2014) Current Sickle Cell Disease Management Practices in Nigeria. *International Health*, **6**, 23-28. https://doi.org/10.1093/inthealth/iht022

[5] Vilela, R.Q., Cavalcante, J.C., Cavalcante, B.F., Araujo, D.L., Lobo Mde, M. and Nunes, F.A. (2012) Quality of Life of Individuals with Sickle Cell Disease Followed

at Referral Centers in Alagoas, Brazil. *Revista Brasileira de Hematologia e Hemoterapia*, **34**, 442-446.

[6] Baskin, M.L., Collins, M.H., Brown, F., Griffith, J.R., Samuels, D., Moody, A., Thompson, M.P., Eckman, J. and Kaslow, N.J. (1998) Psychosocial Considerations in Sickle Cell Disease (SCD): The Transition from Adolescence to Young Adulthood. *Journal of Clinical Psychology in Medical Settings*, **5**, 315-341. https://doi.org/10.1023/A:1026206204009

[7] Newman, D.L., Moffitt, T.E., Caspi, A., Magdol, L., Silva, P.A. and Stanton, W.R. (1996) Psychiatric Disorder in a Birth Cohort of Young Adults: Prevalence, Comorbidity, Clinical Significance, and New Case Incidence from Ages 11 to 21. *Journal of Consulting and Clinical Psychology*, **64**, 552-562. https://doi.org/10.1037/0022-006X.64.3.552

[8] Levenson, J.L., McClish, D.K., Dahman, B.A., Bovbjerg, V.E., de A Citero, V., Penberthy, L.T., Aisiku, I.P., Roberts, J.D., Roseff, S.D. and Smith, W.R. (2008) Depression and Anxiety in Adults with Sickle Cell Disease: The PiSCES Project. *Psychosomatic Medicine*, **70**, 192-196. https://doi.org/10.1097/PSY.0b013e31815ff5c5

[9] Benton, T.D., Ifeagwu, J.A. and Smith-Whitley, K. (2007) Anxiety and Depression in Children and Adolescents with Sickle Cell Disease. *Current Psychiatry Reports*, **9**, 114-121. https://doi.org/10.1007/s11920-007-0080-0

[10] Nardi, B., Francesconi, G., Catena-Dell'osso, M. and Bellantuono, C. (2013) Adolescent Depression: Clinical Features and Therapeutic Strategies. *European Review for Medical and Pharmacological Sciences*, **17**, 1546-1551.

[11] Isa, E.W., Ani, C., Bella-Awusah, T. and Omigbodun, O. (2018) Effects of Psycho-Education plus Basic Cognitive Behavioural Therapy Strategies on Medication-Treated Adolescents with Depressive Disorder in Nigeria. *Journal of Child & Adolescent Mental Health*, **30**, 11-18. https://doi.org/10.2989/17280583.2018.1424634

[12] Bella-Awusah, T., Ani, C., Ajuwon, A. and Omigbodun, O. (2016) Effectiveness of Brief School-Based, Group Cognitive Behavioural Therapy for Depressed Adolescents in South West Nigeria. *Child and Adolescent Mental Health*, **21**, 44-50. https://doi.org/10.1111/camh.12104

[13] Falkenstrom, F., Gee, M.D., Kuria, M.W., Othieno, C.J. and Kumar, M. (2017) Improving the Effectiveness of Psychotherapy in Two Public Hospitals in Nairobi. *BJPsych International*, **14**, 64-66. https://doi.org/10.1192/S2056474000001938

[14] Wade, A. (1999) Statistics and Research Methodology. Institute of Child Health, London.

[15] Bankole, K.O., Bakare, M.O., Edet, B.E., Igwe, M.N., Ewa, A.U., Bankole, I.A. and Olose, E.E. (2017) Psychological Complications Associated with HIV/AIDS Infection among Children in South-South Nigeria, Sub-Saharan Africa. *Cogent Medicine*, **4**, Article ID: 1372869. https://doi.org/10.1080/2331205X.2017.1372869

[16] Olashore, A.A., Ogunwale, A. and Adebowale, T.O. (2016) Correlates of Conduct Disorder among Inmates of a Nigerian Borstal Institution. *Child and Adolescent Psychiatry and Mental Health*, **10**, Article No. 13. https://doi.org/10.1186/s13034-016-0100-0

[17] Adegunloye, O.O., Yusuf, A.D., Ajiboye, P.O., Issa, B.A. and Buhari, I.N. (2010) Prevalence and Correlates of Distruptive Behaviour Disorders in Youths in a Juvenile Borstal Institution. *Nigerian Journal of Psychiatry*, **8**, 12-17. https://doi.org/10.4314/njpsyc.v8i3.60086

[18] Adewuya, A.O., Ola, B.A. and Aloba, O.O. (2007) Prevalence of Major Depressive Disorders and a Validation of the Beck Depression Inventory among Nigerian Adolescents. *European Child & Adolescent Psychiatry*, **16**, 287-292. https://doi.org/10.1007/s00787-006-0557-0

[19] Stevanovic, D., Atilola, O., Balhara, Y.P.S., Avicenna, M., Kandemir, H., Vostanis, P., Knez, R. and Petrov, P. (2015) The Relationships between Alcohol/Drug Use and Quality of Life among Adolescents: An International, Cross-Sectional Study. *Journal of Child & Adolescent Substance Abuse*, **24**, 177-185. https://doi.org/10.1080/1067828X.2013.773864

[20] Dobson, K.S., Hollon, S.D., Dimidjian, S., Schmaling, K.B., Kohlenberg, R.J., Gallop, R.J., Rizvi, S.L., Gollan, J.K., Dunner, D.L. and Jacobson, N.S. (2008) Randomized Trial of Behavioral Activation, Cognitive Therapy, and Antidepressant Medication in the Prevention of Relapse and Recurrence in Major Depression. *Journal of Consulting and Clinical Psychology*, **76**, 468-477. https://doi.org/10.1037/0022-006X.76.3.468

[21] Jacob, M., Keeley, M.L., Ritschel, L. and Craighead, W.E. (2013) Behavioural Activation for the Treatment of Low-Income, African American Adolescents with Major Depressive Disorder: A Case Series. *Clinical Psychology & Psychotherapy*, **20**, 87-96. https://doi.org/10.1002/cpp.774

[22] Takagaki, K., Okamoto, Y., Jinnin, R., Mori, A., Nishiyama, Y., Yamamura, T., Yokoyama, S., Shiota, S., Okamoto, Y., Miyake, Y., Ogata, A., Kunisato, Y., Shimoda, H., Kawakami, N., Furukawa, T.A. and Yamawaki, S. (2016) Behavioral Activation for Late Adolescents with Subthreshold Depression: A Randomized Controlled Trial. *European Child & Adolescent Psychiatry*, **25**, 1171-1182. https://doi.org/10.1007/s00787-016-0842-5

[23] Cuijpers, P., van Straten, A. and Warmerdam, L. (2007) Behavioral Activation Treatments of Depression: A Meta-Analysis. *Clinical Psychology Review*, **27**, 318-326. https://doi.org/10.1016/j.cpr.2006.11.001

[24] Tindall, L., Mikocka-Walus, A., McMillan, D., Wright, B., Hewitt, C. and Gascoyne, S. (2017) Is Behavioural Activation Effective in the Treatment of Depression in Young People? A Systematic Review and Meta-Analysis. *Psychology and Psychotherapy*, **90**, 770-796. https://doi.org/10.1111/papt.12121

[25] Acquadro, C., Berzon, R., Dubois, D., Leidy, N.K., Marquis, P., Revicki, D., Rothman, M. and PRO Harmonization Group (2003) Incorporating the Patient's Perspective into Drug Development and Communication: An Ad Hoc Task Force Report of the Patient-Reported Outcomes (PRO) Harmonization Group Meeting at the Food and Drug Administration, February 16, 2001. *Value in Health*, **6**, 522-531. https://doi.org/10.1046/j.1524-4733.2003.65309.x