

Effectiveness of Behavioural Activation on Reduction of Depression Symptoms among Children and Adolescents: A Study of Seven Selected Children's Homes in Kajiado County, Kenya

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ABSTRACT

The purpose of this study was to assess the effectiveness of behavioural activation (BA) in reducing depression symptoms in a sample of 186 children and adolescents from selected children's homes in Kajiado County. This study was quasi-experimental and used the operant conditioning theory. This theory was ideal because children and adolescents are subject to various positive consequences that subtly shape their behaviour. The participants were purposively sampled and were between ages 9-17 both males and females with a mean age of 13. Participants with scores of 11 or higher on the depression subscale were randomly assigned into either experimental or control arms. The experimental arm received 10 sessions of BA with the control arm receiving treatment as usual (TAU). The participants completed a demographic questionnaire as well as CDI to assess for depression symptoms. Multiple linear regression analysis using SPSS Version 20 was used to identify factors independently associated with levels of depression symptoms. The mean score for the levels of depression was 18.6 ($\pm 5.6SD$). The CDI scores reduction among the participants was significantly associated with time of follow-up (Estimate= -5.86; 95% CI: -8.91 to -2.81; $p < 0.001$) and the intervention (Estimate= -1.86; 95% CI: -3.22 to -0.50; $p = 0.012$). Based on these findings, BA is recommended for children and adolescents presenting with symptoms of depression. Further, this study will help curriculum developers to integrate mental health into the school curriculum. This will help in arresting the symptoms of depression among children and adolescents appropriately and timely.

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Introduction and Background

Adolescence is a critical formative stage in life, marking as it does the passage from childhood to adulthood. Adolescence is also the period when there is a likelihood of the mental disorder developing or becoming apparent. The negative experiences, conditions or environments that affect the mental well-being of younger children also apply to adolescents (World Health Organization, [WHO], 2012). This study was conducted based on findings from research done in orphanages which showed that children entering foster care have a higher occurrence of clinically significant depression symptoms than children reared at home (Ibrahim, El-Basha, El-Gilany, & Khater, 2012). Similarly, Ibrahim et al. (2012) observed that orphaned children are more depressed, more anxious, less optimistic about the future, more likely to express anger feelings and have more disruptive behaviours compared to non-orphans.

Further, according to research carried out by Thapar et al. (2012) and Bang, Park, and Kim (2015), depressed children and adolescents are also at increased risk of social and educational underachievement or impairments, smoking, substance abuse and obesity. These far-reaching consequences of depression underscore the importance of an effective intervention to treat the symptoms of depression. Compared with diagnosis of adults, diagnoses of depressed

children and adolescents are more often missed and have more frequent suicide attempts and thoughts, particularly in teenage girls. There is also serious impairment in social functioning, including poor school achievement and relational problems with family members and peers (Qin et al., 2015).

The greatest adverse effect of depression is the fact that it can lead to suicide with evidence suggesting that approximately a million lives are lost yearly to suicide, translating to 3000 deaths every day (WHO, 2012). Furthermore, depression in children and adolescents is a leading risk factor for suicide since suicide is the second-to-third leading cause of death in this age group. More than half of adolescent suicide victims are reported to have had a depressive disorder at the time of death (Cook, Peterson, & Sheldon, 2009; Thapar, Collishaw, Pine, & Thapar, 2012). Thus, to recognise and treat this disorder is important.

Given the developmental nature of depression and the surging effect of early symptoms of depression on later development of depressive disorders, prevention of depressive disorders should focus on interventions that prevent the emergence of symptoms and the development of syndromes such as major depressive episodes (Muñoz, Beardslee, & Leykin, 2012). It is for this reason that the study employed Behavioural Activation as an intervention for depression among children and adolescents.

Methodology

One of the fundamental aspects of planning a clinical study is the calculation of the sample size. It would neither be practical nor feasible to study the whole population in any study. Therefore, a set of participants is selected from the population, which is less in number (size) but adequately represents the population from which it is drawn so that true inferences about the population can be made from the results obtained. This set of individuals is known as the sample (Kadam & Bhalerao, 2010).

A sample size is drawn from the target population in which the findings can be generalized (Babbie, 2010). The sample size is selected in a careful manner so that it can be a good representation of the intended population for the study.

In this study, the Lemeshow, Hosmer, Klar, and Lwanga's (1990) formula was used to calculate the minimum required sample size. The study used mean and standard deviation estimates by McCauley et al. (2015).

$$n = \frac{\delta^2 (Z_{\alpha/2} + Z_{1-\beta})^2}{(\mu_1 - \mu_2)^2} \mp$$

n - Minimum required sample size

α - Type 1 Error (0.05)

β - Type 2 Error (0.10)

$Z_{\alpha/2}$ - Standard normal deviate at 95% CI (1.96)

$Z_{1-\beta}$ - Standard normal deviate at 80% power CI (0.84)

μ_1 - Estimated mean Behavioural Activation for Depression Scale (BADS) score among children and adolescents from selected children's homes in Kajiado County enrolled to receive treatment as usual, (Activation (17.3), Avoidance (25.1)) – Control arm.

μ_2 - Estimated mean Behavioural Activation for Depression Scale (BADS) score among children and adolescents from selected children's homes in Kajiado County enrolled to receive Behavioural Activation intervention in addition to treatment as usual, (Activation (21.1), Avoidance (16.1)) – Experimental arm.

δ - Standard deviation of mean depression score among children and adolescents from selected children's homes in Kajiado County enrolled to receive treatment as usual, (Activation (7.6), Avoidance (9.1))

$(\mu_1 - \mu_2)$ - Effect size, (Activation (3.8), Avoidance (9.0))

n = 63 (Using Activation estimates)

n = 17 (Using Avoidance estimates)

The study utilized the activation estimates since the sample size was the highest, thereby accommodating avoidance estimation. Since no literature was available to estimate the sample size for CDI, the sample size was presumed to accommodate CDI estimation. Allowing for 20% attrition, the total sample size was adjusted upwards to 76 (Using activation estimates) children and adolescents per study arm. Total number of children and adolescents was 152; 76 among those enrolled to receive treatment as usual (control), and 76 among those enrolled to receive BA intervention in addition to treatment as usual (Experimental). However, in the course of recruitment, the number of participants was slightly over the sample by 17, bringing the number to 93 in the experimental and 93 in the control. A total of 16 children and adolescents dropped out of the experimental arm and 14 from the control arm, giving an attrition rate of 17.22% (experimental group) and 15.0% (control group) which was statistically comparable at ($P=0.690$).

The drop was caused by a number of reasons, lack of school fees, transfer to other schools/homes while others just left without any explanation.

Demographic Questionnaire

This socio-demographic questionnaire included the following variables, age, gender, class, religion, living with mother/father, step-parent, and grandparents) among other issues.

Children Depression Inventory (CDI)

Depression was assessed using CDI. The CDI can be completed in approximately five to ten minutes and does not require specific training for scoring and interpretation. The CDI has proved to have good reliability and validity for describing depression symptoms, has good correlation with other scales, and great prediction validity for suicidal ideas. For this study, scores of 0-10 were considered normal, 11-26 mild while 26-54 were found to be moderate. Each item contains three statements graded in order of increasing severity from 0 to 2; children and adolescents select the one that characterized their symptoms best during the past 2 weeks. The item scores are combined into a total depression score, ranging from 0 to 54. A higher CDI scores means a higher depressive state (Bang et al., 2015). Regarding its validity, many research studies have backed the CDI as assessing relevant constructs both for explanatory and predictive applications for characterizing symptoms of depression in children and adolescents. The CDI-II is a tool that has been extensively tested for validity and reliability since the 1960s, including use in the paediatric population. One study in Nigeria revealed psychometric evidence in support of the CDI-II in the African setting (Adewuya et al., 2007).

Statistical analysis was conducted using IBM SPSS version 20. Microsoft Excel was used in processing statistical output as well as construction of data tables and graphs. Analysis of factors associated with specific outcome variables (CDI) commenced by performing bivariate analysis. Mean $\pm$ SD for specific outcome variables (CDI) across categories of each independent variable were compared using t-tests (two categories) or one-way ANOVA (three or more categories). *Multiple Regression Analysis*: The results of the bivariate analyses informed multivariable statistical regression models for a more thorough exploration of outcome variables. Potential confounders and effect modifiers were tested using multiple linear regression models on continuous outcome variables (CDI). All independent variables with significant mean difference observed were considered together in a multiple linear regression. Beta coefficients with their corresponding standard error were tested by means of a t-test. Beta coefficients with corresponding 95% Confidence Interval (CI) were used to estimate the strength of association between independent and distinct dependent (Outcome) variables. The predictors of depression in this study were selected based on $p < 0.05$.

Results

A total of 186 participants were enrolled in two study groups namely, Control (n=93) and Experimental (n=93). Three assessments were done at baseline, mid-line and end-line on specific population characteristics. Baseline assessment was done on a number of characteristics namely socio-demographic characteristics, socio-support system characteristics, schooling and performance, individual assessment on positivity, and mental illnesses. The measures of mental illnesses was Children Depression Inventory score.

Table 1. Socio-demographic Characteristics of the Participants by Study Group at Baseline.

Variables	Total (n=186)		Experimental (n=93)		Control (n=93)		χ^2 value	df	p value
	n	%	n	%	n	%			
Age in years									
6 - 12 years	78	41.9%	40	43.0%	38	40.9%	0.09	1	0.766
13 - 17 years	108	58.1%	53	57.0%	55	59.1%			
Gender									
Male	79	42.5%	36	38.7%	43	46.2%	1.08	1	0.299
Female	107	57.5%	57	61.3%	50	53.8%			
Primary language of communication									
Kiswahili	35	18.8%	17	18.3%	18	19.4%	0.04	1	0.851
English	151	81.2%	76	81.7%	75	80.6%			
Religion									
Roman Catholic	18	9.7%	9	9.7%	9	9.7%	4.19	3	0.242
Protestant	102	54.8%	57	61.3%	45	48.4%			
Seventh Day Adventist	38	20.4%	14	15.1%	24	25.8%			
Others	28	15.1%	13	14.0%	15	16.1%			

Table 2. Socio-Support System Characteristics of the Participants by Study Group at Baseline.

Variables	Total (n=186)		Experimental (n=93)		Control (n=93)		χ^2 value	df	p value
	n	%	n	%	n	%			
Current residence									
Children's home	108	58.1%	45	48.4%	63	67.7%	7.15	1	0.007
Home	78	41.9%	48	51.6%	30	32.3%			
Do you have any siblings									
Yes	169	90.9%	82	88.2%	87	93.5%	1.62	1	0.203
No	17	9.1%	11	11.8%	6	6.5%			
Birth position									
First born	49	26.3%	25	26.9%	24	25.8%	2.12	5	0.833
Second born	49	26.3%	24	25.8%	25	26.9%			
Third born	36	19.4%	17	18.3%	19	20.4%			
Fourth born	24	12.9%	14	15.1%	10	10.8%			
Fifth born	8	4.3%	5	5.4%	3	3.2%			
Other	20	10.8%	8	8.6%	12	12.9%			
Mother alive									
Yes	130	69.9%	70	75.3%	60	64.5%	5.19	2	0.075
No	34	18.3%	11	11.8%	23	24.7%			
I don't know	22	11.8%	12	12.9%	10	10.8%			
Father alive									
Yes	119	64.0%	64	68.8%	55	59.1%	4.26	2	0.119
No	35	18.8%	12	12.9%	23	24.7%			
I don't know	32	17.2%	17	18.3%	15	16.1%			
Have any known relatives									
Yes	177	95.2%	90	96.8%	87	93.5%	1.05	1	0.305
No	9	4.8%	3	3.2%	6	6.5%			

After 3 months (mid-line) and 6 months (end-line) of intervention for participants enrolled in the experimental group and *treatment as usual* for participants enrolled in the

Control group, assessments were done on two primary indicators measures of mental illnesses (Children Depression Inventory (CDI) scores in order to establish changes between and within the study groups.

Table1 presents the distribution of socio-demographic characteristics of the participants by study groups at baseline. There was no significant difference in distribution of all socio-demographic characteristics of the participants between the study groups ($P>0.05$).

Analysis of socio-support system characteristics of the participants by study group at baseline was done as presented in Table 2. There was no significant difference in distribution of most of the socio-support system characteristics of the participants between the study groups ($P>0.05$). However, there was a significant difference in distribution of participants by current residence($p=0.007$). Distribution of participants by whether their mother was alive was

marginally significantly different between the study groups ($P=0.075$).

Table 3 presents the distribution of schooling and performance of the participants by study groups at baseline. There was significant difference in distribution of the participants by their current grade ($p=0.041$) and self-rating of school performance ($p<0.001$) between the study groups.

Participant's individual self-rating on positivity was assessed as presented in Table 4. Almost all variables were not significantly differently distributed between the study groups ($P>0.05$). However, there was a significant difference in distribution of participants by whether they were able to do things as well as other people do ($p=0.019$).

Table 5 presents mean, standard deviation and range of Children Depression Inventory (CDI) scores at baseline. Overall mean Children Depression Inventory (CDI) score was 18.6 (± 5.6 SD) ranging between 11 and 38. There was no significant difference in mean Children Depression Inventory (CDI) score between participants enrolled in control group (18.7 (± 5.4 SD)) and those enrolled in experimental group (18.5 (± 5.9 SD)), ($p=0.774$) baseline.

Table 3. Schooling and Performance of the Participants by Study Group at Baseline.

Variables	Total (n=186)		Experimental (n=93)		Control (n=93)		χ^2 value	df	p value
	n	%	n	%	n	%			
Current grade									
Class 4	45	24.2%	22	23.7%	23	24.7%	9.95	4	0.041
Class 5	44	23.7%	29	31.2%	15	16.1%			
Class 6	41	22.0%	19	20.4%	22	23.7%			
Class 7	35	18.8%	11	11.8%	24	25.8%			
Class 8	21	11.3%	12	12.9%	9	9.7%			
Enjoy going to school									
Yes	184	98.9%	91	97.8%	93	100.0%	2.02	1	0.155
No	2	1.1%	2	2.2%	0	0.0%			
Self-rating of school performance									
Very good	107	57.5%	66	71.0%	41	44.1%	15.43	2	<0.001
Good	71	38.2%	26	28.0%	45	48.4%			
Poor	8	4.3%	1	1.1%	7	7.5%			
Have friends in school									
Yes	173	93.0%	86	92.5%	87	93.5%	0.08	1	0.774
No	13	7.0%	7	7.5%	6	6.5%			

Table 4. Participant's Individual Self-Rating on Positivity and Use of Medication by Study Group at Baseline.

Variables	Total (n=186)		Experimental (n=93)		Control (n=93)		χ^2 value	df	p value
	n	%	n	%	n	%			
Many times I feel like a failure									
Agree	86	46.2%	41	44.1%	45	48.4%	0.35	1	0.556
Do not agree	100	53.8%	52	55.9%	48	51.6%			
I am able to do things as well as other people do									
Agree	138	74.2%	76	81.7%	62	66.7%	5.50	1	0.019
Do not agree	48	25.8%	17	18.3%	31	33.3%			
In the morning, do not feel like waking up at all									
Always	29	15.6%	19	20.4%	10	10.8%	5.85	3	0.119
Sometimes	115	61.8%	52	55.9%	63	67.7%			
Rarely	15	8.1%	10	10.8%	5	5.4%			
Never	27	14.5%	12	12.9%	15	16.1%			
On medication									
Yes	29	15.6%	15	16.1%	14	15.1%	0.04	1	0.840
No	157	84.4%	78	83.9%	79	84.9%			

Table 5. Levels of Depression Characteristics of the Participants by Study Group at Baseline.

Variables	n	Mean	SD	95% CI		Min.	Max.
				Lower	Upper		
CDI scores							
Total	186	18.6	5.6	17.8	19.4	11	38
Experimental	93	18.5	5.9	17.3	19.7	11	38
Control	93	18.7	5.4	17.6	19.8	11	33
P value		0.774					
BAI scores							
Total	186	19.5	12.1	17.7	21.2	0	54
Experimental	93	19.7	12.2	17.2	22.2	0	46
Control	93	19.3	12.1	16.8	21.8	0	54
P value		0.852					

Table 6. Severity of Children Depression Inventory (CDI) Among The Participants by Study Group at Baseline.

Variables	Total (n=186)		Experimental (n=93)		Control (n=93)		χ^2 value	df	p value
	n	%	n	%	n	%			
Children Depression Inventory (CDI) scores									
11-26 - Mild	172	92.5%	83	89.2%	89	95.7%	2.78	1	0.095
27-40 - Moderate	14	7.5%	10	10.8%	4	4.3%			

Analysis of severity of Children Depression Inventory (CDI) by study group at baseline was done as presented in Table 6. There was no significant difference in distribution of participants by severity of Children Depression Inventory (CDI) ($p>0.05$).

Table 7 presents the analysis of mean CDI score between and within study groups at baseline, midline, and end line. Between group comparison revealed that mean CDI score at baseline was closely comparable between experimental

(18.3±6.0) and control (18.9±5.6) arms ($p=0.519$). Mean CDI score was significantly low in experimental arm (8.4±5.3) compared to control (12.3±7.3) arm at midline ($p<0.001$). Similarly, mean CDI score was significantly low in experimental arm (6.6±7.0) compared to control (10.9±8.6) arm at endline ($p=0.001$).

Within group comparison revealed that mean CDI score in experimental arm was significantly high at baseline (18.3±6.0) compared to midline (8.4±5.3; $p<0.001$) and

Table 7. Mean CDI Between and Within Groups at Baseline, Midline, and Endline.

Time point	Experimental			Control			p value
	N	Mean	SD	N	Mean	SD	
Baseline	77	18.3	6.0	79	18.9	5.6	0.519
Midline	77	8.4	5.3	79	12.3	7.3	<0.001
p value: Baseline vs. Midline		<0.001			<0.001		
Endline	77	6.6	7.0	79	10.9	8.6	0.001
p value: Baseline vs. Endline		<0.001			<0.001		
Difference of Difference							
Baseline – Midline	77	9.8	8.1	79	6.6	9.0	0.020
Baseline – Endline	77	11.7	8.4	79	8.0	9.7	0.012

endline (6.6 ± 7.0 ; $p < 0.001$). Similarly, in control arm, mean CDI score was significantly high at baseline (18.9 ± 5.6) compared to midline (12.3 ± 7.3 ; $p < 0.001$) and endline (10.9 ± 8.6 ; $p < 0.001$).

Analysis of mean of changes in CDI scores between baseline and midline revealed that there were significant changes in experimental arm (9.8 ± 8.1) compared to control arm (6.6 ± 9.0 ; $p = 0.020$). Similarly, mean of changes in CDI scores between baseline and endline revealed that there were significant changes in experimental arm (11.7 ± 8.4) compared to control arm (8.0 ± 9.7 ; $p = 0.012$).

Distribution of CDI scores among participants in experimental and control arms was done as presented in Figure 1. The participants enrolled in both experimental and control arms had comparable values at baseline. This is demonstrated by the overlap and crossing of the cumulative distribution curves.

At midline, there was a negative shift of the cumulative distribution curve for participants enrolled in both experimental and control arms. However, the shift was more in experimental than the control arm. This implies that the intervention is able to accelerate healing much faster than treatment as usual.

Similarly, at endline, there was even further negative shift of the cumulative distribution curve for participants enrolled in both experimental and control arms. However, the shift was more in experimental than the control arm, implying that the intervention is able to accelerate healing much faster than treatment as usual.

The much pronounced negative shift of the cumulative distribution curve for participants enrolled in experimental compared to control arm revealed that the intervention worked in significantly reducing depression among the participants

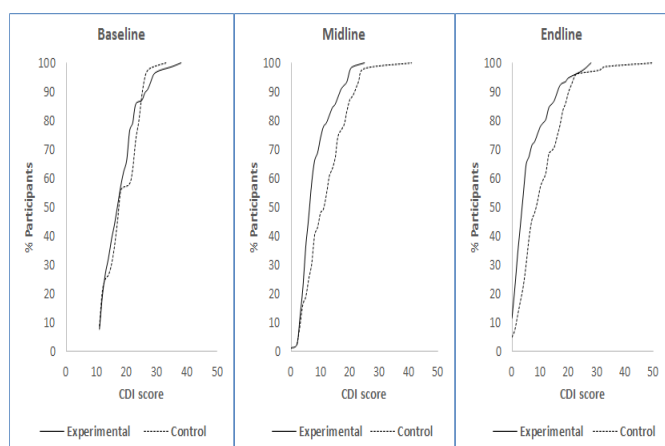
Table 8 presents overall effect of the intervention with time of follow-up on CDI score. Adjusting for Currently residence, Current grade, Self-rating of school performance and being able to do things as well as other people do; CDI score reduction among the participants was significantly associated with time of follow-up (Estimate= -5.86; 95% CI: -8.91 to -2.81; $p < 0.001$) and the intervention (Estimate= -1.86; 95% CI: -3.22 to -0.50; $p = 0.012$). This implies that the rate of reduction in CDI score attributable to the intervention was 1.86 score/month compared to non-reduction in treatment as usual.

Table 8. Overall effect of the intervention on CDI score.

Effect	Estimate	Standard Error	DF	t-value	p-value
Intercept	17.12	1.43	235	12.00	<0.001
Currently residence					
Children's home	0.05	0.75	202	0.07	0.948
Home	0.00				
Current grade					
Class 4	0.48	1.21	202	0.40	0.692
Class 5	-1.42	1.25	202	-1.14	0.257
Class 6	-2.01	1.28	202	-1.57	0.118
Class 7	0.46	1.25	202	0.37	0.712
Class 8	0.00				
Self-rating of school performance					
Good	1.42	0.76	202	1.88	0.062
Poor	2.13	2.06	202	1.03	0.304
Very good	0.00				
Being able to do things as well as other people do					
Agree	-0.08	0.82	202	-0.09	0.927
Do not agree	0.00				
Groups					
Control-baseline	0.00				
Experimental-baseline	-0.43	0.84	310	0.52	0.605
Time	-5.86	0.52	155	-11.23	<0.001
Time*Groups					
Control	0.00				
Experimental	-1.86	0.73	155	2.54	0.012

The findings revealed an inverse relationship between BA and depression symptoms which were significantly reduced. In this study, after adjusting for confounders, CDI scores reduction among the participants was significantly associated with time of follow-up (Estimate= -5.86; 95% CI: -8.91 to -2.81; $p < 0.001$) and the intervention (Estimate= -1.86; 95% CI: -3.22 to -0.50; $p = 0.012$). The rate of reduction in CDI scores attributable to the intervention was 1.86 score/month compared to non-reduction in treatment as usual. This meant that BA was effective in reducing depression symptoms among the participants under study.

The result was consistent with other studies done that revealed the effectiveness of BA on depression symptoms.

**Figure 1. CDI score between study arms at baseline, midline and endline.**

According to Ekers et al. (2014), BA for depression was compared to controls in 25 studies including 31 comparisons and 1088 participants. The SMD (g) at post treatment was 20.74 (95% CI 20.91 to 20.56 p,0.001 NNT 2.5), indicating a large effect size.

According to Soleimani et al. (2015), in a study comparing the effectiveness of BA and CT administered in group settings in university students with subsyndromal anxiety and depressive symptoms, the results showed that both treatments could lower the severity of symptoms and functional impairments in participants. However, BA was more effective than CT in reducing depressive symptoms as assessed through both statistical and clinical significance (Soleiman et al., 2015).

Correspondingly, Kuroki and Ishibashi (2015), a long-term follow-up study showed an advantage of using BA compared to pharmacology in regard to the persistence of the effect and cost-effectiveness. Since BA does not require learning of complex skills and is also time-efficient, it is recommended as the first-line treatment for mild or moderate depression. Similarly, according to Kanter et al. (2012), BA holds promise in reducing the global burden of depression as a treatment approach that is efficient, easy to teach, scalable and acceptable to providers and patients across settings and cultures.

Similarly, Nauert (2016), BA is relatively easy, meaning it can be delivered with little training thus making it a cost-effective option. It is estimated to be about 20 per cent cheaper than CBT, suggesting it could help alleviate current difficulties in accessing timely and affordable treatment. Besides, BA encourages people to focus on meaningful activities driven by their own personal values as a way of overcoming depression. Similar observation was made by Richards et al. (2016) who noted that effective psychological therapy for depression could be delivered without the need for costly and highly trained professionals. In this research, the researcher worked with Masters students who had taken about a week to train. The BA training manual was easy to use for the research assistants. In other words, BA was relatively easy and cost effective and the researcher suggests it is an effective intervention to use among depressed children and adolescents in children's homes.

Similarly, Dimidjian et al. (2006) noted that BA was shown to be as beneficial as anti-depressant medication in treating major depression and without the harmful physical side-effects. Further still, BA has demonstrated to be more effective than anti-depressant medications at preventing relapse of depression after treatment has ended (Portland Psychotherapy, 2012).

Conclusion

The discussion on effectiveness is suggestive of a large effect size besides the treatment being cost-effective, time efficient and relatively simple to train. This makes it a good choice of therapy among children and adolescents presenting with depression symptoms, not only in Kajiado County but in Kenya as a whole.

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