

# Efficacy of guided internet-assisted intervention on depression reduction among educational technology students of Nigerian universities

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## Abstract

**Background/Objective:** The study's objective was to determine the efficacy of guided internet-assisted intervention (GIAI) on depression reduction among educational technology students of Nigerian universities.

**Methods:** The design of the study was a 10-weeks group-randomized trial (GRT) which involved a pre-test, post-test, and follow-up assessment. A total of 192 educational technology students who were identified as having depression formed the sample of the study. Beck's Depression Inventory-II (BDI-II) was the measure used for data collection in the study. Data collected were analyzed using ANOVA with repeated measures.

**Results:** The initial assessment results showed that the participants in both treatment and usual-care control groups had depression. After 10-weeks participation in GIAI, the assessment results showed a significant reduction in depression among students in the treatment group when compared to those in the usual-care control group. The follow-up assessment indicated a further significant reduction in the depression among participants in the treatment group when compared to those in the usual-care control group.

**Conclusion:** The authors concluded that GIAI was significantly effective in reducing depression among university students in the treatment group compared to those in the usual-care control group. Therefore, educational technologists, counselors, psychologists, health workers, and other social workers should adopt educational intervention using GIAI in helping university students undergo depression reduction.

**Abbreviations:** BDI-II = Beck's Depression Inventory-II, GIAI = guided internet-assisted intervention.

**Keywords:** depression reduction, educational technology students, guided internet-assisted intervention, Nigerian universities

## 1. Introduction

The prevalence of depression among university students is increasing. As observed by Ibrahim et al,<sup>[1]</sup> depression is a common health problem that ranked third after cardiac and respiratory diseases, and university students are at higher risk of it. In a study by Dahlin et al,<sup>[2]</sup> it was observed that the prevalence of

depressive symptoms among students was 12.9%, significantly higher than in the general population, out of which 2.7% of students had attempted to commit suicide. Shamsuddin et al<sup>[3]</sup> found that in a study with university students, 27.5% of the students had moderate, and 9.7% had severe or extremely severe depression. A recent study in south-east Nigeria showed that a surveyed sample of students (97.3%) had severe depression.<sup>[4]</sup> The authors noted that university students face challenges related to independent living and academics which predispose them to severe depression. Other studies confirmed a severe rate of depression among university students.<sup>[5–8]</sup> Thus, depressive symptoms among university students became a significant and emergent public health concern for which efficient intervention is needed.<sup>[9–12]</sup>

There is evidence that depressed university students are reluctant to seek intervention due to difficulties in attending therapy during usual school hours, financial constraints, lack of motivation, and the predicted waiting period toward intervention.<sup>[13]</sup> Thus, evidence-based intervention, usually conducted on a face-to-face basis, has limitations and gaps in depression treatment literature. However, there is evidence that internet-assisted interventions may lead to clinically relevant changes among depressed individuals.<sup>[8]</sup> To fill the existing gap between needs and provision of face-to-face treatment, internet-assisted interventions are encouraged. Literature shows the treatment gap between available depression interventions and individuals benefiting from such interventions.<sup>[13–15]</sup> Moreover, an extensive

Editor: Eric Bush.

The authors have no conflicts of interest to disclose.

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How to cite this article: Ofoegbu TO, Asogwa U, Otu MS, Ibenegbu C, Muhammed A, Eze B. Efficacy of guided internet-assisted intervention on depression reduction among educational technology students of Nigerian universities. *Medicine* 2020;99:6(e18774).

Received: 2 April 2019 / Received in final form: 15 November 2019 / Accepted: 13 December 2019

<http://dx.doi.org/10.1097/MD.00000000000018774>

variety of internet interventions have been previously developed for reducing symptoms of depression among individuals of some populations,<sup>[13,16]</sup> except educational technology students of Nigerian universities. Meanwhile, educational technology students of Nigerian universities may prefer internet-based intervention because the internet is part of their curriculum.<sup>[17–19]</sup>

Study<sup>[13]</sup> further confirm that there may be small-to-medium effect sizes when internet-assisted interventions are delivered as stand-alone self-help interventions, but medium-to-large effect sizes when delivered as therapist-guided interventions. Hence, an internet-based intervention may be more efficacious when it is guided by therapists. But previous studies have failed to explain whether the Guided Internet-Assisted Intervention (GIAI) will be efficacious on depression reduction among educational technology students of Nigerian universities. Therefore, the objective of the study was to determine the efficacy of GIAI on depression reduction among educational technology students of Nigerian universities. The hypothesis that GIAI will be efficacious on depression reduction was tested. Given that self-defeating life patterns, irrational thinking patterns, negative feelings, maladaptive behaviors, and ignorance may cause depression,<sup>[6,20–22]</sup> GIAI adopted the principle of internet-based cognitive behavior therapy (ICBT) used in previous studies.<sup>[23,24]</sup>

## 2. Method

### 2.1. Ethical consideration

This study was approved by the Research and Ethics committee of the Department of Art Education, University of Nigeria, Nsukka. Informed written consent was obtained from all the study participants through email, after explaining to them the purpose and procedure of the study. It was clearly explained that participants can withdraw from the study willingly at any point in the study. Besides, the confidentiality of students' responses and data was maintained. Again, the research procedure of this study was designed in line with the ethical standards of the institutional and national research committee, as in the previous study.<sup>[25]</sup>

### 2.2. Study design

The design of the study is a 10-week group-randomized trial (GRT) which involved a pre-test, post-test, and follow-up assessment. Using the GRT design, the authors of the current study used groups to serve as the primary sampling unit in the selection process. The groups were randomized into 2 arms, and then responses were measured on individuals within those groups.<sup>[26]</sup> According to Lee et al,<sup>[26]</sup> GRT has become a standard study design to assess the effect of a clinical intervention program for disease prevention.

### 2.3. Inclusion and exclusion criteria

Inclusion criteria included having depression, being an educational technology student of a Nigerian Federal University, not being currently in any depression intervention or psychotherapy, having a laptop, iPhone, tablet, or smartphone that accesses the internet, and being willing to sign informed consent to participate in the study. The authors also set the exclusion criteria to include having the presence of bipolar or psychotic subtypes of depression, panic disorder, current substance abuse, past or present schizophrenia, organic brain syndrome, being currently in educational intervention, psychotherapy, psychotropic medication or hospitalization for psychosis, or risk of imminent

**Table 1**

**Participant demographics.**

Variable	Treatment group, N (%)	No-treatment group, N (%)	$\chi^2$	Significance
Gender				
Male	19 (44.2%)	24 (55.8%)		
Female	37 (53.6%)	32 (46.4%)	6.036 <sup>a</sup>	.336
Age	24.21 ± 5.21	23.78 ± 4.43	.217	.643
Year of study				
First	12 (40.0%)	18 (60.0%)		
Second	14 (66.7%)	7 (33.3%)	8.786	.862
Third	21 (52.5%)	19 (47.5%)		
Fourth	9 (42.9%)	12 (57.1%)		
Marital status				
Single	19 (52.8%)	17 (47.2%)		
Married	15 (62.5%)	9 (37.5%)	3.42	.138
Divorced	14 (50.0%)	14 (50.0%)		
Engaged	8 (33.3%)	16 (66.7%)		
Sponsorship				
Self	8 (66.7%)	4 (33.3%)		
Parents	28 (49.1%)	29 (50.9%)	42.357 <sup>c</sup>	.352
Scholarship	11 (47.8%)	12 (52.2%)		
Others	9 (45.0%)	11 (55.0%)		

Mean age (SD) of participants in years.  $\chi^2$  = chi-square.

suicide, as in previous study.<sup>[6]</sup> The criteria were determined by the therapists through self-report by the participants via email and confidential telephone calls, following internet intervention guidelines.<sup>[27]</sup>

### 2.4. Study participants

Six hundred eighty potential participants were recruited through federal university students' portals in Nigeria, but 192 students met the inclusion criteria. The demographic characteristics of the eligible students are shown in Table 1. The adequacy of the sample size was determined using G\*Power 3.1 software.<sup>[28]</sup> Before the end of the study, 78 participants dropped out, giving a missing data value of about 41%. See the participants' flow diagram (Fig. 1).

### 2.5. Measure

*Beck's Depression Inventory-II (BDI-II)*. The BDI-II contains 21 items that assess the incidence and severity of the symptoms of depression.<sup>[20,21,29]</sup> The items of BDI-II are categorized into affective (8 items) and somatic (13 items) subscales. The scoring value of BDI-II is a 4-point scale of 0 to 3 arranged in increasing severity about a particular symptom of depression. Also, 21 items were selected based on depressive symptoms described in DSM-IV criteria. Based on previous studies,<sup>[6]</sup> the benchmark used in the interpretation of scores in the BDI-II ranges from 0 to 13 = minimal depression; 14 to 19 = mild depression; 20 to 28 = moderate depression; and 29 to 63 = severe depression. The internal reliability consistency of the BDI-II in a previous study,<sup>[6]</sup> was 0.89 alpha while in the current study, the internal reliability consistency was 0.91 alpha.

### 2.6. Procedure

The study comprised of 2 groups: the treatment group and the usual-care control group. Each of the groups made up of

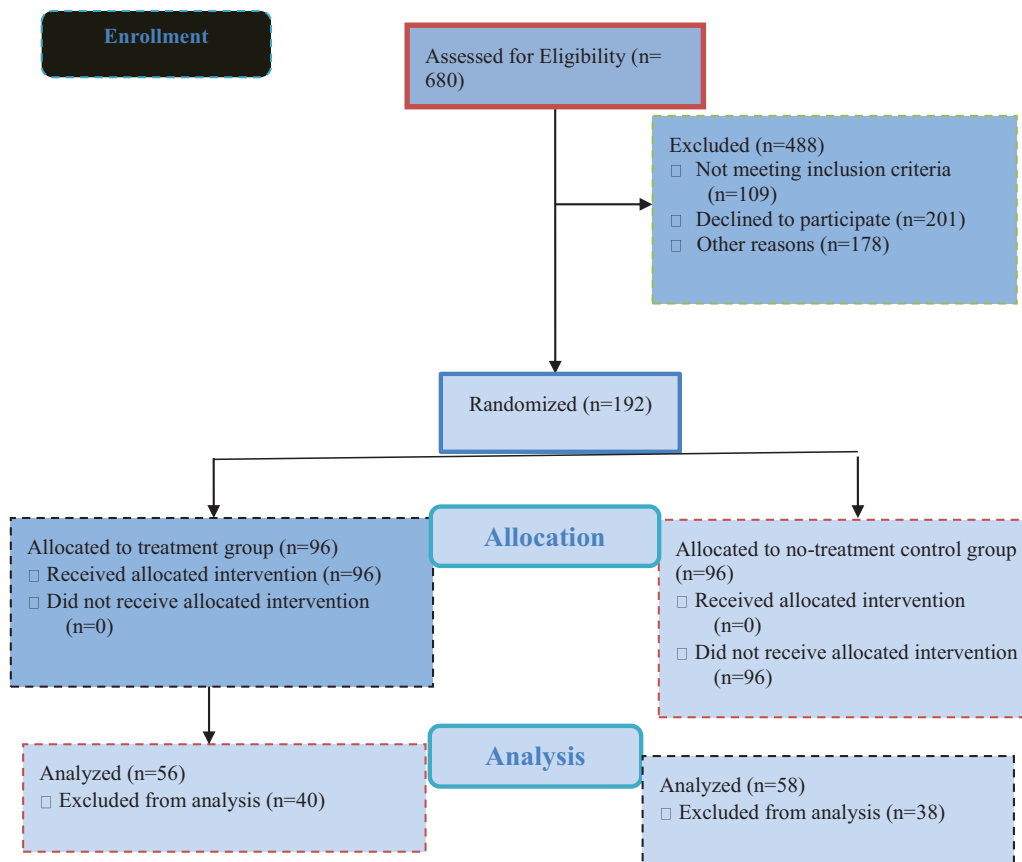


Figure 1. Flow diagram: This legend shows the distribution of participants into the treatment and control groups.

96 participants who were randomly allocated, following a sequence generated by computer allocation software.<sup>[30]</sup> A baseline assessment (Time 1) was conducted in the 2 groups before the intervention through email messages. Participants in the treatment group were allowed to attend a 10-week GIAI while the participants in the usual-care control group were free to have their usual care. Thereafter, a post-intervention assessment (Time 2) was conducted in the treatment group and the usual-care control group via email. After 4 weeks, a follow-up assessment (Time 3) was conducted in both the treatment group and the usual-care control group via email. The 3 sets of data – Time 1, Time 2, and Time 3 were subjected to analysis to determine the outcome of the study. The data analysts were all experts in clinical data analysis and interpretation.

**2.7. Intervention**

**2.7.1. Guided internet-assisted intervention.** Guided internet-assisted intervention is a structured and standardized intervention delivered through the internet. The researchers of the current study developed the GIAI following guidelines for internet interventions<sup>[27]</sup> and internet-administered depression intervention protocol.<sup>[31]</sup> In line with the previous studies,<sup>[8,13,31,32]</sup> GIAI includes the provision of helpful materials through the internet, an initial support session through telephone and regular guidance from the therapists through telephone and the internet. The therapists were a clinical staff of the federal universities in Southeast Nigeria with proven evidence of expertise in depression intervention. The GIAI helped the participants to maintain self-

reflection and identity construction which are the qualities needed for the depression reduction process.<sup>[33]</sup>

Guided internet-assisted intervention was a 10-weeks intervention that covers psychoeducation, interactive peer support, cognitive disputation, behavioral homework assignments, role-play, and depression management. The GIAI therapists also followed the principles of ICBT in line with previous studies.<sup>[23,24]</sup> The therapists guided the participants in the treatment group to find selected videos, audios, and print materials for depression treatment based on the aforesaid topics. The participants were asked to work independently with the program while the guidance therapists provided twice-a-week assistance within the portals and through email and telephone. Also, participants were permitted to obtain at-need guidance from the therapists through messages within the portals, email, or by telephone contact.

**2.8. Data analysis**

We used chi-square and *t* test to check the participants' demographic characteristics while the data concerning the potential confounders (gender, age, year of study, marital status, and sponsorship) were analyzed using descriptive statistics and one-way ANOVA. We used ANOVAs for repeated measures with the factors – Time (within-subjects variables), Group (between-subjects factors) and Time × Group-interaction, and then partial  $\eta^2$  to measure the effect size of GIAI. We used SPSS(R) 22.0 (IBM Corporation, Armonk, NY) for Windows(R)/Apple Mac(R)<sup>[34]</sup> to

**Table 2**  
Depression scores across potential confounders in educational technology students of Nigerian universities.

Potential confounders	Category	N	Mean	SD	P	95%CI
Gender	Male	43	63.97	8.04	.288	61.49–66.45
	Female	69	65.71	8.53		63.65–67.76
Age	17–24 yr old	53	64.83	8.62	.970	62.45–67.20
	25–32 yr old	38	65.57	9.37		62.49–68.66
	33–40 yr old	18	64.66	5.49		61.93–67.40
	41 yr old plus	3	64.33	7.37		46.02–82.64
Year of study	First	30	65.76	9.03	.186	62.39–69.13
	Second	21	65.85	7.92		62.25–69.46
	Third	40	62.85	7.63		60.40–65.29
	Fourth	21	67.38	8.74		63.39–71.36
Marital status	Single	36	64.94	9.43	.637	61.75–68.13
	Married	24	66.79	8.66		63.13–70.44
	Divorced	28	63.79	5.98		61.42–66.07
	Engaged	24	64.95	8.92		61.19–68.72
Sponsorship	Self	12	69.08	8.11	.206	63.92–74.24
	Parents	57	65.19	8.66		62.89–67.49
	Scholarship	23	62.73	5.74		60.25–65.22
	Others	20	64.85	9.69		60.31–69.38

conduct all the statistical analyses in the study and all the results were measured as significant at  $P \leq .05$  as in previous study.<sup>[3,5]</sup>

### 3. Results

In Table 1, we observed that those in the treatment group comprised 19 (44.2%) male and 37 (53.6%), female participants, while the usual-care control group comprised 24 (55.8%) male and 32 (46.4%), female participants, with no significant difference,  $\chi^2 = 6.036$ ,  $P = .336$ . The mean age of the treatment group was  $24.21 \pm 5.21$  years, while that of the usual-care control group was  $23.78 \pm 4.43$  years, with no significant difference,  $t = .217$ ,  $P = .643$ . We present the details of other demographics like a year of study, marital status, and sponsorship in Table 1.

Table 2 shows the depression scores of the study participants in respect of potential confounders assessed in the study, using  $t$  test or one-way ANOVA statistics where appropriate. The data was broken down to show the association between BDI-II and the potential confounders such as gender, age, year of study, marital status, and sponsorship.

Table 3 shows the results of a 3-time assessment of educational technology students of the Nigerian universities on depression reduction using the Beck's Depression Inventory-II (BDI-II). Table 3 specifies that there was no significant difference between the treatment and usual-care control groups in initial Beck's Depression Inventory-II (BDI-II), with  $F(1111) = 0.107$ ,  $P = .745$ ,

$\eta_p^2 = .001$ . The students in both treatment and usual-care control groups had severe depression.

The measure after the intervention using GIAI indicates a significant reduction in depression among the participants in the treatment group when compared to their counterparts in the usual-care control group,  $F(1111) = 254.56$ ,  $P = .000$ ,  $\eta_p^2 = .956$ . See Figure 2 for the graphical representation of the result.

Likewise, the follow-up measure (Time 3) showed that there was a significant reduction in depression among participants in the treatment group than those in the usual-care control group,  $F(1111) = 261.89$ ,  $P = .000$ ,  $\eta_p^2 = .960$ . See Figure 3 graphical representation of this result. Based on these results, we assert that GIAI was significantly efficacious in reducing depression.

### 4. Discussion

At the baseline measure, we found that there was a severe level of depression among participants in both treatment and usual-care control groups. This finding agrees with previous findings which indicate a high prevalence of depression among university students.<sup>[2,3,5–7]</sup> However, GIAI was efficacious in reducing the rate of depression among university students in the treatment group when compared to those in the usual-care control group. The efficacy of the intervention was significantly sustained in the treatment group at follow-up meetings. These current findings support the outcome of previous researches which confirmed that

**Table 3**  
Results on the efficacy of guided internet-assisted intervention for depression reduction by BDI-II.

Outcome	Treatment group (n=56)			Usual-care control group (n=58)			df	F	Sig.	$\eta_p^2$	95% confidence interval	
	Time 1 M (SD)	Time 2 M (SD)	Time 3 M (SD)	Time 1 M (SD)	Time 2 M (SD)	Time 3 M (SD)					Lower bound	Upper bound
BDI-II	65.30 (2.61)			64.78 (3.67)			1111	.107	.745	.001	62.56	67.01
		8.60 (0.21)			66.44 (3.08)		1111	254.56	.000	.959	64.83	68.05
			7.39 (2.60)			65.50 (2.41)	1111	261.89	.000	.960	63.93	67.06

$\eta_p^2$  = effect size, BDI-II = Beck's Depression Inventory, df = degree of freedom, M = mean, SD = standard deviation, Sig = significant value.

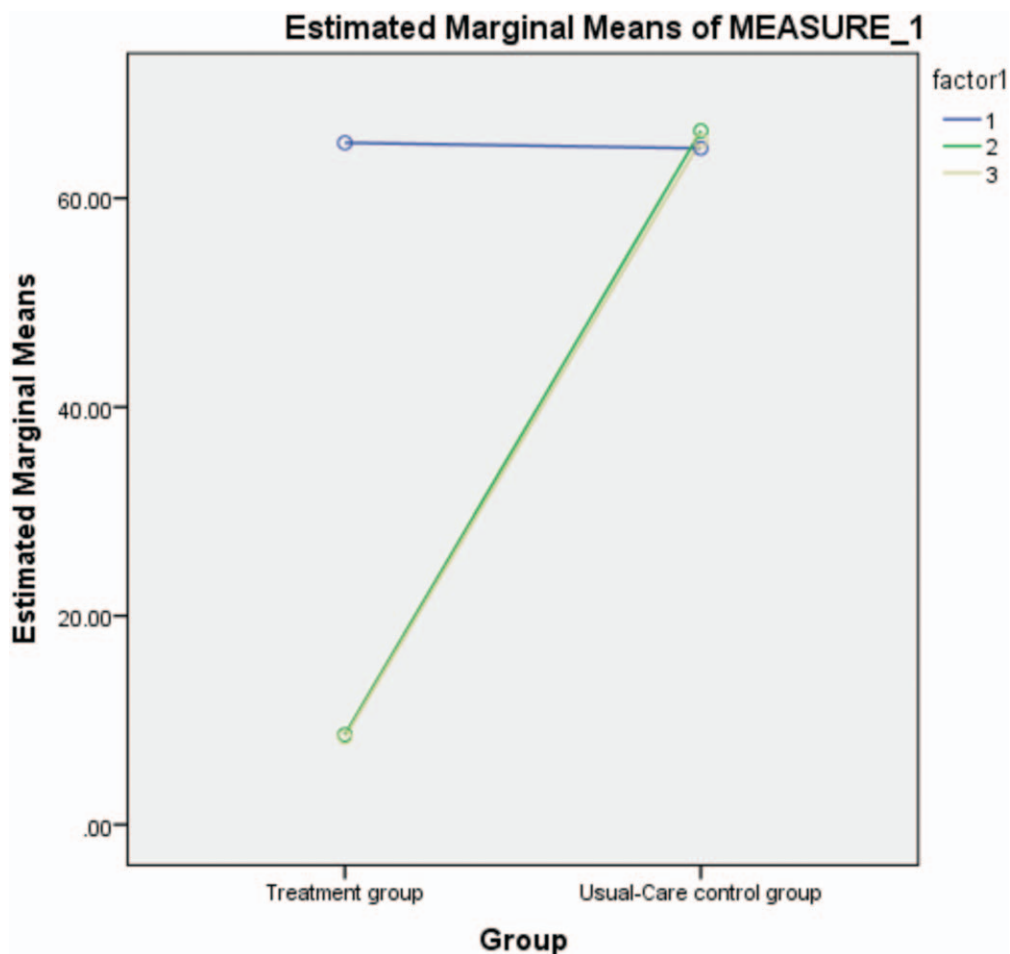


Figure 2. Graphical representation of results. This legend shows graphical presentation result.

internet-based interventions guided by therapists are effective for depression treatment.<sup>[8,13,16,31]</sup>

Going by the previous assertion that depressed university students are reluctant to seek face-to-face intervention,<sup>[13]</sup> one may suggest that guided GIAI would give the university students ample opportunity to participate in depression intervention. Moreover, educational technology students may prefer internet intervention since it appears that the internet is part of their curriculum. Thus, GIAI principles should be adopted by depression therapists to perform depression treatment among university students. Coupled with the evidence that 96% of young people spend an average of 11 hours on the internet,<sup>[36]</sup> the use of GIAI for depression reduction will be effective among the university students who are mostly young people.

**4.1. Implications**

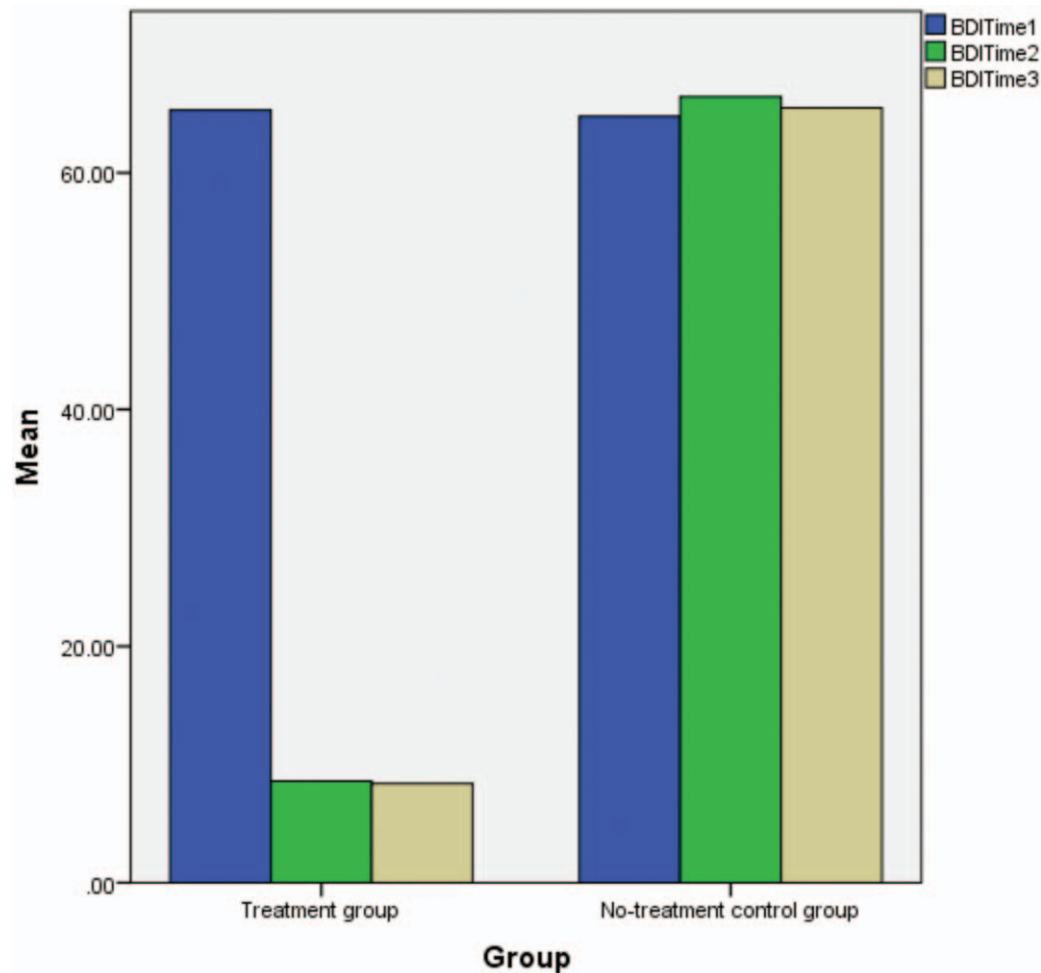
The findings of the study have implications for educational technology practice, counseling, psychotherapy, research, and policy. The GIAI is a key concept in the educational technology discipline that is charged with the responsibility of enhancing the quality of learning through the use of various instructional resources. Educational technologists are known by their ethical practice of facilitating educational interventions by creating, using, and managing appropriate technological processes and resour-

ces.<sup>[37,38]</sup> To confirm this claim, the present findings demonstrated that GIAI was effective in reducing depression among students. This implies that there is a need for an instructional resource like GIAI to be used extensively to help students solve health-related problems like depression.<sup>[39]</sup> Universities and other tertiary institutions should adopt a policy that permits the use of GIAI to perform medical and psychotherapeutic processes to enhance healthy living among the students. Also, medical and health practitioners and professionals should adopt GIAI for the management of depression in hospitals, health centers, medical schools, and university campuses. Based on the findings of the present study, it appears that the application of GIAI will increase the quality of medical practices and research.

**4.2. Limitations**

Though the present study generated significant positive findings, there are some notable limitations. The investigators acknowledge that the sample size included only educational technology students of Nigeria universities. Therefore, future studies should endeavor to cover other higher institutions in Southeast, Nigeria for probable generalization of findings to all tertiary education students in the country.

Another limitation is that the efficacy of GIAI was assessed using instrument which produced essentially quantitative data.



**Figure 3.** Bar chart. This legend shows the bar chart of the results.

Therefore, it is pertinent for future studies to also collect qualitative data via interviews, observation and the participants' opinions to complement the findings based on quantitative data. Additionally, even though a follow-up assessment was conducted in this study, proper consideration for the long-term effect of GIAI may be required. To this end, it would be needful for future researchers to focus on conducting long-term follow-up assessments to determine the possibility of maintaining an increase in depression reduction through GIAI.

Again, the use of the usual-care control group in the study made only the participants in the treatment group benefit from the GIAI, whereas those in the usual-care control group were disadvantaged. Therefore, it is needful for future investigators to provide participants under the control condition with the chance of having informal discussions after the intervention and follow-up activities. Lastly, the analysis of the data in the study did not consider demographic variables. Future researchers should consider the moderating and mediating impact of some demographic variables.

## 5. Conclusion

The objective of this study was to determine the efficacy of GIAI on depression reduction among educational technology students of Nigerian universities. The study's findings indicated that GIAI

was efficacious in reducing depression among participants in the treatment group when compared to those in the usual-care control group. Capturing from this finding, the investigators made a recommendation that GIAI be used across the universities in Nigeria and other countries for depression reduction among students. It is further recommended that educational technologists, counselors, psychologists, health workers, and other social workers with a satisfactory knowledge of GIAI should use this approach in helping students undergo depression reduction.

## Acknowledgments

The authors acknowledged the previous researchers whose studies are cited in this work. The study participants, consultants, reviewers, and editors are appreciated for their contributions and scrutiny which helped to improve the standard of the study.

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