

Intervention for stress management among skilled construction workers

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Abstract

Objective: Previous studies have demonstrated the need for a stress management intervention among construction workers. Construction workers, despite their degree of stress, are expected to contribute to the accomplishment of projects on construction sites. This study aimed to ascertain the effect of a group rational emotive behavior therapy (group REBT) on stress management among a select sample of skilled construction workers in construction industry in Nigeria.

Methods: With a randomized controlled trial design, 160 skilled construction workers completed the study and responded to the perceived stress scale-14 and work-related irrational beliefs questionnaire. Participants were randomly allocated to either the intervention group (n=80) or the control group (n=80). The main method of data analysis used in the study was repeated measures within-between subjects analysis of variance statistic.

Results: Results show that group REBT significantly improved stress and work-related irrational beliefs scores of the skilled construction workers after they were exposed to the intervention and compared with their colleagues in the control group. The significant reduction in stress and work-related irrational beliefs scores of the treatment group were also sustained at follow-up.

Conclusion: Group REBT was significant in reducing stress and work-related irrational beliefs among the skilled construction workers.

Abbreviations: FCT = Federal Capital Territory, REBT = rational-emotive behavior therapy.

Keywords: construction industry, group rational emotive behavior therapy, irrational beliefs, skilled construction workers, stress management

1. Introduction

Research has documented that stress at work contributes to employees' absenteeism, low morale, high occupational hazards, higher turnover rates, reduced productivity, and rise in

company's medical expenditures.^[1-3] Research has confirmed the presence of stress within the construction industry.^[4-6] This is because construction industry is a project-driven industry that places emphasis on a high premium product delivery that is on time, within budget, and to required standards. Stress is a feeling of emotional or physical tension resulting from any event or thought that makes an individual feel frustrated, angry, or nervous. Stress among construction workers can have an effect on the delivery process of construction projects.^[7,8] Stress is often seen as the main source of adverse reactions which can impair the health, performance, and safety of construction workers.^[2] Leung et al^[9] found that a high level of stress is associated with external demands such as time constraints, deadlines, and workload among construction workers who were responsible for preparing bids for projects in Hong Kong.

Wahab^[10] reported that 93.3% of construction workers in Nigeria indicated that they experienced stress. Similarly, Ibem et al^[11] found that 94% of workers in the building construction industry in Nigeria reported having experienced work stress. These findings are in line with those of previous studies^[12,13] which found that over 80% of construction workers in Pakistan and India respectively experienced stress on account of their job. Despite these reports illustrating the incidence of stress and the need to deliver a stress management intervention among construction workers both in Nigeria and elsewhere, available literature to our knowledge, suggests that less is known about how much they have benefitted from any group-based stress management intervention.

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The datasets generated during and/or analyzed during the current study are available from the corresponding author on reasonable request.

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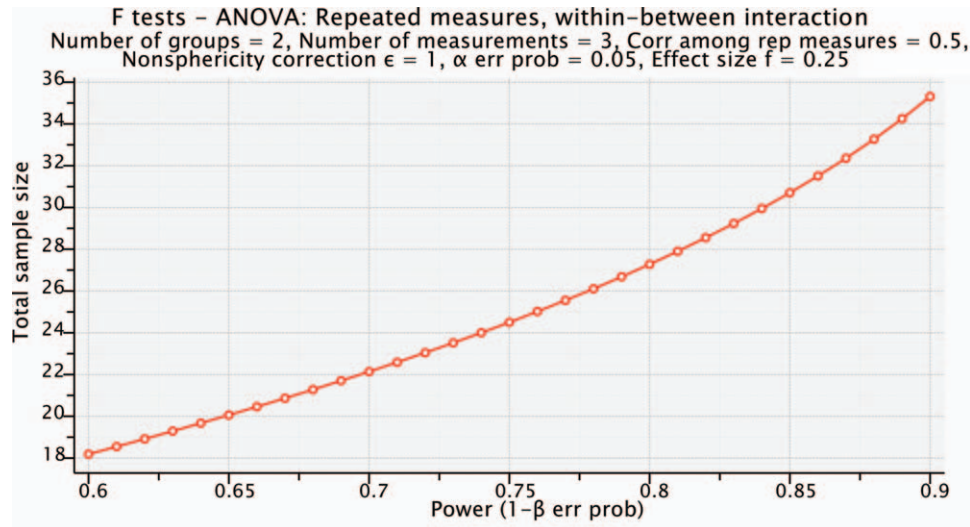


Figure 1. G-power analysis for sample size determination.

Several group-based approaches have been explored by researchers in the quest to ameliorate stress problems among clients in different settings, including a stress inoculation approach among athletes,^[14] a mindfulness intervention approach among older adults,^[15] acceptance and commitment therapy among social workers,^[16] emotion-focused therapy among military veterans,^[17] and group rational-emotive behavior therapy (group REBT) among parents, undergraduates, teachers, and nursing students.^[18–24] The group REBT approach developed by Albert Ellis in 1955 is an evidence-based group intervention for remedying stress in different client groups by identifying and adjusting clients' thoughts, feelings, and beliefs that make them vulnerable to stress.^[22,25,26]

While there are studies which have reported the incidence of stress and stress-related tasks among Nigerian construction workers,^[11,27] studies on group intervention for managing stress among these construction workers are very scarce. Moreover, most of the previous studies reporting on the efficacy of group REBT on stress have some weaknesses which the present study seeks to address such as lack of clarity in reporting based on statistical approaches adopted, fewer samples and lack of information regarding treatment fidelity and compliance.^[18–23,28]

Given that the construction industry is also dynamic and demanding and construction workers experience high amount of stress in a bid to perform well,^[29] group REBT may be beneficial in promoting stress coping among these workers. Therefore, this research aimed to examine the effect of group REBT on stress management among a sample of skilled construction workers in the Nigerian construction industry. It is hypothesized that group REBT will ameliorate stress among skilled construction workers in the construction industry.

2. Method

2.1. Ethical considerations

Approval for this randomized controlled trial was obtained from the Faculty of Vocational and Technical Education Research Committee, University of Nigeria Nsukka. All individual

participants completed an informed consent form. The study adhered to the ethical principles of Helsinki Declaration by the World Medical Association.

2.2. Participants

The participants were skilled workers in construction firms within the Federal Capital Territory (FCT), Abuja, Nigeria. These participants were targeted for the current intervention following the evidence of stress in this sector. We determined the sample size for this study by using G*Power software^[30,31] at an alpha level of =0.05; effect size of =0.25; target power =0.90; $n = 36$. The sample size for this study was 160 participants; this exceeded the required sample size as indicated by the Gpower output. Figure 1 shows the results of the sample size determination from Gpower.

Participants' selection bias was prevented by generating random allocation sequence with random allocation software program.^[32] Using the random allocation software program, participants were randomly allocated to either the intervention group ($n = 80$) or the control group ($n = 80$). To mask allocations until the participants were assigned to the 2 groups, the sequence was applied using sealed envelopes, opaque, sequentially numbered, and pressure sensitive paper.^[33] The study flowchart presented in Fig. 2 illustrates the inclusion and exclusion of participants based on their eligibility.

2.3. Inclusion and exclusion criteria

The following inclusion criteria were adopted for participation in the study: being a skilled construction worker in a construction firm within the FCT, being highly stressed, not participating in an intervention for stress management as of the time of enrollment, and completing consent form to participate. Failure to meet any of these criteria, made one ineligible for the study. These inclusion and exclusion criteria are in accordance with those of previous REBT studies on stress management.^[21–23,28]

2.3.1. Description of group REBT treatment. The group REBT manual for stress management adapted for use in this study was

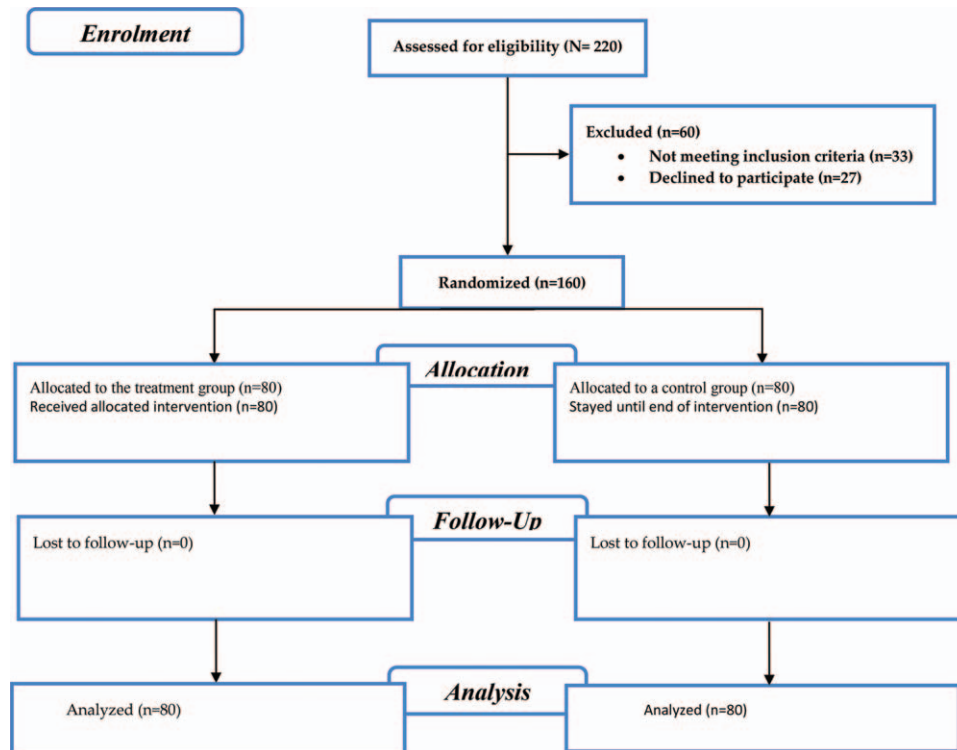


Figure 2. Participant eligibility criteria.

developed by Ugwoke et al.^[2,3] The group REBT stress management manual aims to direct the participants through several REBT prescribed group exercises designed to reduce stress by deliberate thought change and belief system adjustment over the course of 8 weeks. Particularly, the group intervention entails directing the participants to spot their job and non-job-related irrational beliefs and stressors. Participants were enlightened on the different group REBT techniques (socratic questioning, cognitive reversal, disputing, and rational self-talk) for improving their stress perception and associated irrational beliefs at work. Every therapeutic session is concluded with a homework assignment which is completed ahead of the next session. The ABCDE technique was also used in the course of the group intervention where “A” is the activating event in the worker’s life; “B” is the set of beliefs that largely decides or control worker’s response to the A; “C” is the worker’s troubled emotion which is the consequence of their beliefs; “D” is the disputing of illogical and disturbance-creating beliefs; and, “E” is effective thinking pattern that they are committed to adopting.^[2,5,34]

2.4. Experimental procedure

Data were collected from the intervention and control groups at various points in time: pre-test (Time 1), post-test (Time 2), and follow-up test (Time 3). The construction companies within the FCT were visited by the researchers in order to talk about the study with the skilled construction workers. Phone numbers and email addresses were also exchanged between volunteer skilled construction workers and researchers after they had filled the informed consent form.

At the onset of the study, a convenience sample of 220 skilled construction workers completed a questionnaire survey which

aimed to find out those with high stress and work-related irrational beliefs. Copies of each questionnaire were made available to all volunteers who were expected to complete it within 2 weeks. Different set of bulk text messages were dispatched at different intervals to remind the volunteers about completing and submitting the questionnaires ahead of the deadline. Several respondents (86.8%) reported high stress and high work irrational belief scores, but 160 construction skilled construction workers eventually completed the study. This initial data provided the baseline result (Time 1).

A Telegram group was created for those in the control group as a placebo and to keep them busy throughout the study period. In this group, motivational posts related to stress and other mental health issues such as depression were shared and discussed every week. Group members under the guidance of a group leader discussed each post for 75 minutes over the course of 8 weeks.

The intervention group took part in a weekly REBT program which lasted for 8 weeks of 75 minutes each. The group REBT manual for stress management^[2,3] was adapted and used for this group treatment. This group intervention embodies cognitive restructuring components and provided training on cognitive-behavioral and coping skills for stress management to participants. Additional details about this treatment program can be found in Ugwoke et al.^[2,3] Group meetings were held outside work hours.

At the end of the treatment intervention, the participating skilled construction workers in both groups were measured to acquire data for Time 2 (post-test). After 3 months from Time 2, 4-week follow-up meetings were held twice weekly and in the end, there was an appraisal of the skilled construction workers’ stress and irrational beliefs for the third time which yielded the follow-up data (Time 3). The delivery of the treatment and

control interventions were in English language. We saw to it that questionnaires were dispersed, completed accordingly, and retrieved from all participants at different points in time.

The group adherence to the treatment condition was monitored and recorded through completed homework assignments. Group attendance was also tracked for this purpose. An integrity checklist was used to ascertain therapists' adherence to the components of the stress management intervention package such as the session goals, activities, and techniques. At the end, members of each group provided self-report of their adherence and satisfaction with the therapy using a behavioral checklist.

2.5. Data collection tools

2.5.1. Demographic questionnaire. The demographic characteristics of the participants were obtained using a demographic questionnaire. The information sought after were category of the construction firm, years of experience, sex, monthly income, marital status, and ethnicity.

2.5.2. Perceived stress scale-14. The perceived stress scale-14 (PSS-14) is a stress assessment instrument developed by Cohen et al.^[35] The items were prepared to assess the extent to which the situations in one's life are considered stressful in the last 1 month. It has 14 items with a 5-point rating scale of never (0) to very often (4). Items 4, 5, 6, 7, 9, and 10 were reversed before scores are summed up, so as to determine the stress level. Higher scores meant higher level of stress while lower scores indicate lower level of stress. Previous studies using the PSS-14 reported Cronbach alpha values ranging between 0.77 and 0.88.^[36,37] The PSS-14 in this study yielded a Cronbach reliability alpha of 0.85.

2.6. Work-related irrational beliefs questionnaire

The work-related irrational beliefs questionnaire (WIB-Q) is an irrational beliefs assessment instrument developed by van Wijhe et al.^[38] It consists of 20 items with a 5-point rating scale of strongly disagree (0) to strongly agree (4). The questionnaire contains 4 subscales with each of the subscales containing 5 items. The subscales measure performance demands (Cronbach $\alpha=0.74$), coworker's approval (Cronbach $\alpha=0.80$), failure (Cronbach $\alpha=0.77$), and control (Cronbach $\alpha=0.83$) to determine workers' irrational beliefs level (van Wijhe et al.^[38]). Higher scores indicate a higher level of irrationality while lower scores indicate a low level of irrationality. The WIB-Q in this study yielded an overall Cronbach reliability alpha of 0.82.

2.6.1. Data analysis. In this study, we carried out a within and between-subject factors 2-way mixed repeated measures analysis of variance (rmAnova) to establish the main effect of group, the main effect of time and the group \times time interaction effect. We also performed a post-hoc analysis using Sidak. In order to be sure our data met the assumptions of the rmAnova, we conducted the Mauchly test for sphericity. The result showed that the assumptions of Sphericity were met ($\chi^2(2)=5.925, P=.97$ for PSS-14; $\chi^2(2)=3.218, P=.93$ for WIB-Q). All the statistical analyses including screening for missing values were done using SPSS 22.

3. Results

Table 1 shows that 48 (30%), 16 (10%), and 16 (10%) participants in the intervention group were skilled construction

Table 1
Participants' demographic variables.

Variable	Treatment group n (%)	Control group, n (%)	χ^2	P
Category of construction firm				
Small-scale	48 (30%)	32 (20%)	2.866	.239
Large-scale	16 (10%)	36 (22.5%)		
Multinational	16 (10%)	12 (7.5%)		
Gender				
Male	64 (40%)	60 (37.5%)	0.143	.705
Female	16 (10%)	20 (12.5%)		
Years of experience				
<10 years	20 (12.5%)	24 (15%)	0.422	.936
10–20 years	28 (17.5%)	24 (15%)		
21–30 years	20 (12.5%)	16 (10%)		
Above 30 years	12 (7.5%)	16 (10%)		
Monthly income				
\leq 50K	16 (10%)	28 (17.5%)	2.096	.718
51K–100K	12 (7.5%)	12 (7.5%)		
101K–150K	16 (10%)	20 (12.5%)		
151K–200K	20 (12.5%)	12 (7.5%)		
Above 200K	16 (10%)	8 (5%)		
Marital status				
Single	20 (12.5%)	32 (20%)	1.137	.768
Married	20 (12.5%)	16 (10%)		
Divorced	28 (17.5%)	20 (12.5%)		
Widowed	12 (7.5%)	28 (17.5%)		
Ethnicity				
Hausa	32 (20%)	28 (17.5%)	0.443	.801
Igbo	24 (15%)	32 (20%)		
Yoruba	24 (15%)	20 (12.5%)		

χ^2 = chi-square, N = number of participants.

Table 2
Means, standard deviations, and rmAnova statistics for study variables.

Variables	Treatment group		Control group		rmAnova				
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	Effect	<i>F</i> -ratio	<i>df</i>	η_p^2	95% CI
Stress									
Time 1	50.10	1.45	49.85	1.47	G	67402.80*	1, 158	0.99	[49.7, 50.2]
Time 2	14.40	2.69	51.15	2.76	T	3119.44*	2, 316	0.95	[32.3, 33.2]
Time 3	15.60	2.37	50.20	2.87	G × T	3436.07*	2, 316	0.96	[32.4, 33.3]
Irrational beliefs									
Time 1	72.30	3.12	72.45	2.34	G	13798.04*	1, 158	0.99	[71.9, 72.8]
Time 2	23.30	3.98	73.95	2.89	T	4383.89*	2, 316	0.97	[48.1, 49.2]
Time 3	21.20	2.17	71.35	2.45	G × T	4425.35*	2, 316	0.97	[45.9, 46.2]

CI=confidence interval, G × T=group × time interaction, G=group, *M*=mean, *N*=125, *SD*=standard deviation, T=time.
* $P < .05$.

workers in small, large, and multinational construction firms respectively, whereas, 32 (20%), 36 (22.5%), and 12 (7.5%) participants from small, large, and multinational construction firms respectively constituted the control group ($\chi^2=0.2866$, $P=.239$). Also, those in the intervention group comprised of 64 (40%) male skilled construction workers and 16 (10%) female skilled construction workers, while the control group comprised of 60 (37.5%) male skilled construction workers and 20 (12.5%) female skilled construction workers ($\chi^2=0.143$, $P=.705$). Other demographics details such as years of work experience, monthly income, marital status, and ethnicity as shown in Table 1 recorded no significant differences.

Table 2 shows the results for stress scores of the skilled construction workers by group and time. As shown, baseline stress scores were similar for the treatment group ($M=50.10$, $SD=1.45$) and control group ($M=49.85$, $SD=1.47$). The results further revealed a significant main effect of group on participants' stress scores, $F(1,158)=67,402.80$, $P < .05$, $\eta_p^2=0.99$. Post hoc analysis indicated that the treatment group participants ($M=14.40$, $SD=2.69$) experienced a significant reduction in stress scores compared with the control group participants ($M=51.15$, $SD=2.76$) ($P < .05$) (see Table 3).

The results also show that there was a statistically significant effect of time on participants' stress scores, $F(2,316)=3119.44$, $P < .05$, $\eta_p^2=0.95$ (see Table 2). Post hoc analysis illustrated statistically significant changes in REBT participants' stress scores across the time points ($P_s < .05$) (see Table 4).

The results further show that there was statistically significant group × time interaction effect on participants' stress scores, $F(2,316)=3436.07$, $P < .05$, $\eta_p^2=0.96$ (see Table 2). Figure 3 is a graphical presentation of the interaction effect of group and time on participants' stress scores.

Table 3
Post-hoc tests with Sidak by group for study variables.

Variables	(I) Groups	(J) Groups	MD (I–J)	95% CI
Stress				
	Treatment	Control	-23.70*	[-24.2, -23.2]
	Control	Treatment	23.70*	[23.2, 24.2]
Irrational beliefs				
	Treatment	Control	-33.65*	[-34.2, -33.1]
	Control	Treatment	33.65*	[33.1, 34.2]

CI=confidence interval, MD=mean difference.
* $P < .05$ based on Sidak test.

Table 2 shows the results for work-related irrational beliefs of the skilled construction workers by group and time. As shown, baseline work-related irrational beliefs scores were similar for the treatment group ($M=72.30$, $SD=3.12$) and control group ($M=72.45$, $SD=2.34$). The results further revealed a significant main effect of group on participants' work-related irrational beliefs scores, $F(1,158)=13,798.04$, $P < .05$, $\eta_p^2=0.99$. Post hoc analysis indicated that the treatment group participants ($M=23.30$, $SD=3.98$) experienced a significant reduction in work-related irrational beliefs scores compared with the control group participants ($M=73.95$, $SD=2.89$) ($P < .05$) (see Table 3).

The results also show that there was a statistically significant effect of time on participants' work-related irrational beliefs scores, $F(2,316)=4383.89$, $P < .05$, $\eta_p^2=0.97$ (see Table 2). Post hoc analysis illustrated statistically significant changes in REBT participants' work-related irrational beliefs scores across the time points ($P_s < .05$) (see Table 4).

The results further show that there was statistically significant group × time interaction effect on participants' work-related irrational beliefs, $F(2,316)=4425.35$, $P < .05$, $\eta_p^2=0.97$ (see Table 2). Figure 4 is a graphical presentation of the interaction effect of group and time on participants' work-related irrational beliefs.

Table 4
Post-hoc tests with Sidak by time for study variables.

Variables	(I) Time	(J) Time	MD (I–J)	95% CI
Stress				
	Time 1	Time 2	17.20*	[16.7, 17.7]
		Time 3	17.08*	[16.5, 17.7]
	Time 2	Time 1	-17.20*	[-17.7, -16.7]
		Time 3	-0.125	[-.83, .58]
	Time 3	Time 1	-17.08*	[-17.7, -16.5]
		Time 2	0.125	[-.58, .83]
Irrational beliefs				
	Time 1	Time 2	23.75*	[23.0, 24.5]
		Time 3	26.10*	[25.4, 26.8]
	Time 2	Time 1	-23.75*	[-24.5, -23.0]
		Time 3	2.35*	[1.6, 3.1]
	Time 3	Time 1	-26.10*	[-26.8, -25.4]
		Time 2	-2.35*	[-3.1, -1.6]

CI=confidence interval, MD=mean difference.
* $P < .05$ based on Sidak test.

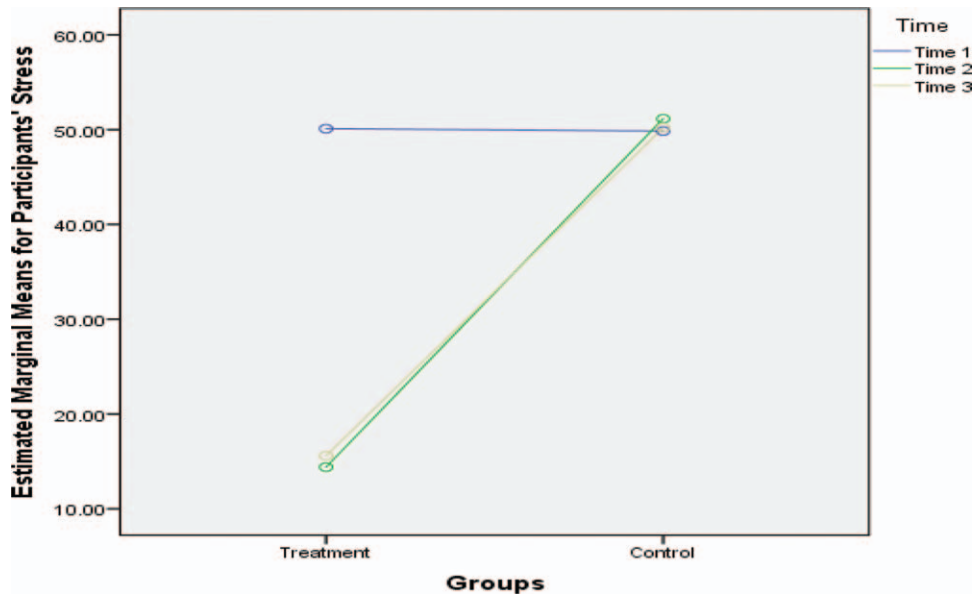


Figure 3. Graphical presentation of the interaction effect of group and time on participants' mean stress.

4. Discussion

The purpose of this study was to investigate the effect of group REBT on stress management among skilled construction workers in the Nigerian construction industry. In line with previous studies which reported the occurrence of stress among construction workers,^[2,36,39-43] the construction workers showed an elevated level of stress at the onset of the study. After exposure to group REBT, construction workers experienced a significant drop in stress level and work-related irrational beliefs compared with their colleagues in the control group. This development was maintained after a 4-week follow-up period. These findings

aligned with previous studies which reported the effectiveness of group REBT programs in reducing stress and altering irrational beliefs across a variety of participant types.^[21-23,28,44-48] The use of both stress and irrational belief scales in this study was informed by previous works of REBT experts who indicated that in an REBT intervention, it is very crucial to assess both participants' disturbed emotions and their irrational beliefs.^[49] This is because it can help therapists to further elucidate the impact of REBT treatment on irrational beliefs which are considered the main cause of emotional disturbance and also demonstrate whether the treatment altered such emotional

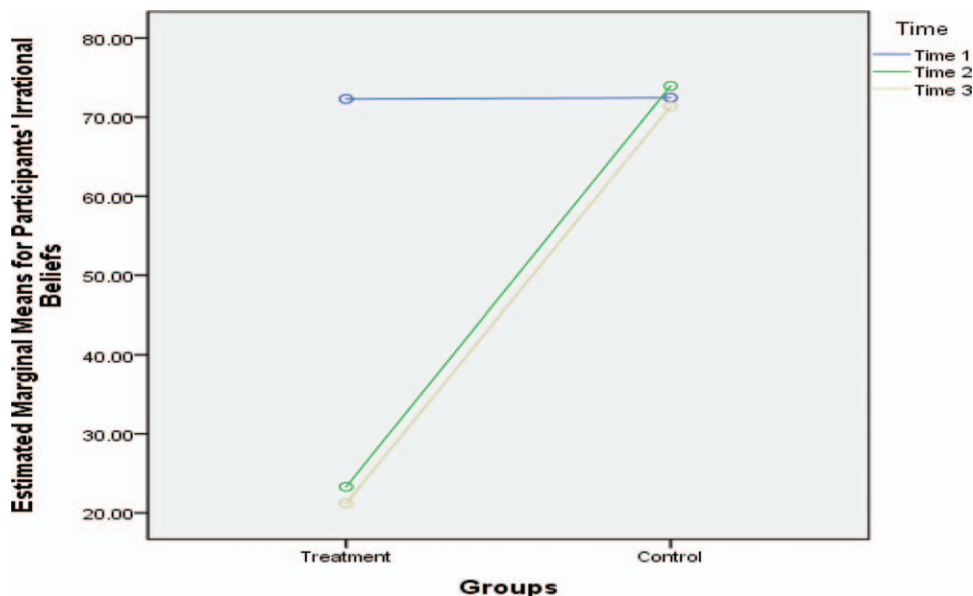


Figure 4. Graphical presentation of the interaction effect of group and time on participants' work-related irrational beliefs.

disturbance and the associated irrational beliefs as expected. It is worthy to note that the primary data collection instrument which is the PSS-14^[35] is one of the mostly widely used tools for the assessment of psychological stress and was developed with similar postulation of REBT theory about stress. The assumption of REBT theory about stress is that people's feelings, beliefs, and thoughts about life events are linked to the amount of stress they experience.^[25] In developing the PSS-14, Cohen et al^[35] considered perceived stress as people's feelings or thoughts about how much stressful their life has been over a given time period. In addition, previous REBT research on stress management had successfully applied this measurement tool in collecting data from their study participants.^[20] These illustrations made the Perceived Stress Scale a relevant tool for data collection in this study. Also, the WIB-Q^[38] was developed based on the propositions of the theory of REBT and this makes it a relevant tool for REBT research. Given the link between stress and irrational beliefs as proposed by REBT theory, both data collection tools were needed to provide clinical insights about the mechanisms of therapeutic change in the context of an REBT program.

While there appears to be other approaches for reducing stress, this current study has added to the empirical evidence supporting the clinical utility of group REBT in reducing the stress of workers in the construction industry. More importantly, the group REBT program provides a substitute for pharmacotherapy approach to stress reduction among construction workers. Stress reduction approaches which employs cognitive restructuring mechanism based on REBT procedures makes available behavioral, emotional, and cognitive coping skills.^[50] It is hoped that this study will stimulate future works in other engineering sectors to continuously validate the REBT approach for managing stress which would make way for its greater generalizability. Although the current study succeeded in investigating the effect of group rational emotive behavior therapy on stress management among skilled construction workers in the Nigerian construction industry, some issues have been identified as the limitations. Given that we studied only skilled construction workers, the findings of the study may not be generalizable to other groups with various attributes in the construction industry outside Nigeria. The study did not take into account interaction effect of the main treatment variable and other moderating covariates such as sex, job experience, marital status, age, among others. Future studies should further investigate the influence of such variables. Another limitation is the lack of any objectifying "outside double blind" rater to measure effect of any clinical modality. However, as an exploration of the group REBT's potential for effectiveness with this particular population, given the lack of studies in this area, justifies the publication and outlining of recommendations for further methodologically improved studies of this area. It is suggested that the clinician-rated and qualitative methods of collecting data be included in subsequent studies for possible triangulation and reduction of reporting bias. Finally, the follow-up period seems to be very short, which raises question as to the intervention's longer term effectiveness. The lack of measurement of group process variables is another limitation of this study. We recommend a comparative design studying the effectiveness of group REBT against another group clinical therapeutic approach modality (another short-term dynamic, humanistic), in addition to the controls which would receive psychotropic medication and those with placebo/no therapy.

We recommend that construction firms should offer skilled construction workers opportunities to practice REBT stress management strategies. Companies should look into providing mental health resources for workers and group REBT appears to be a promising intervention to consider. Given the evidence from our study that group REBT helped to reduce the stress of skilled construction workers, there is a need for a workplace policy for construction workers which would aim to raise psychological health awareness and encourage stakeholders' collaboration in the delivery of psychological interventions such as group REBT to reduce skilled construction workers' stress. Such policy should also foster synergies among therapists, employees, employers, and other relevant stakeholders towards the development and implementation of stress management interventions for skilled construction workers. For therapists and researchers alike, this study furthers their awareness of the increasing need to extend their stress management services and research on stress reduction to skilled construction workers as well as the multi-industry usefulness of group REBT in stress management. Since group REBT has been demonstrated to be an effective method for reducing stress of skilled construction workers, the finding provides direction for future studies to examine its efficacy in managing stress among workers in this sector.

5. Conclusion

Working in the construction industry is very stressful. This study examined the effect of group REBT on stress among skilled construction workers in the construction industry. It was observed that group REBT was significant in reducing stress and work-related irrational beliefs among the skilled construction workers. The significant reduction in stress and work-related irrational beliefs scores of the treatment group were also sustained at follow-up. There is a need to increase the length of follow-up and for the use of clinician-rated and qualitative data in subsequent studies to reduce probable reporting bias on part of skilled construction workers.

Author contributions

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