


# Occupational stress among Nigerian construction trade artisans in the building construction sector

## An intervention study

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### Abstract

**Background:** Construction work can negatively affect artisans' mental health in the form of stress. This research investigated the effect of cognitive behavioral intervention on occupational stress among Nigerian construction trade artisans in the building construction sector.

**Methods:** In this randomized controlled study involving 3 waves of data collection, 140 construction trade artisans who presented with high occupational stress symptoms at the study onset were assigned randomly to either a treatment condition (n=70) or to a waitlist control condition (n=70). The study involved pre-treatment and post-treatment assessments and a 3-months follow-up. The artisans' occupational stress questionnaire and artisans' dysfunctional thoughts at work scale were the data collection instruments.

**Results:** Results revealed a significant effect of group on artisans' occupational stress and dysfunctional thoughts at work. Also, significant effects of time on artisans' occupational stress and dysfunctional thoughts at work were recorded. Finally, group × time interaction effects on artisans' occupational stress and dysfunctional thoughts at work were significant.

**Conclusion:** Cognitive behavioral intervention effectively reduced occupational stress symptoms and dysfunctional thoughts at work among Nigerian construction trade artisans compared with a waitlist control condition.

**Abbreviations:** AOSQ = artisans' occupational stress questionnaire, ADTWS = artisans' dysfunctional thoughts at work scale, CBI = cognitive behavioral intervention.

**Keywords:** cognitive behavioral intervention, construction trade artisans, dysfunctional thoughts at work, occupational stress

## 1. Introduction

Stress is the adverse reaction of individuals in response to too many demands and pressures placed on them,<sup>[1]</sup> and this is

Editor: Chiedu Eseadi.

The authors have no conflicts of interest to disclose.

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

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How to cite this article: Omeje HO, Okereke GK, Asogwa JO, Obe PI, Nwaodo SI, Ariyo SO, Okanya VA, Vincent DA, Chukwu DU, Ike JO, Udogu KC, Ugwuanyi CS, Aneke M. Occupational stress among Nigerian construction trade artisans in the building construction sector: an intervention study. *Medicine* 2021;100:20(e26028).

Received: 7 March 2021 / Received in final form: 20 April 2021 / Accepted: 26 April 2021

<http://dx.doi.org/10.1097/MD.00000000000026028>

because they lack sufficient resources to manage such demands and pressures. Michie noted that when the individual's resources are not adequate to deal with the demands and pressures of the situation, the individual experiences a psychological and physical condition known as stress.<sup>[2]</sup> Occupational stress may be described as stress which affects individuals in the world of work and/or chosen occupation following excessive work pressures and demands placed on them which they do not have sufficient resources that are required to tackle them. This form of stress could be a major cause of illness among workers; it is associated with high occurrences of sickness leave, low morale, increased turnover rates, and an increase in occupational errors.<sup>[1,3]</sup> The experience of stress can also subvert the accomplishment of corporate goals.<sup>[2]</sup> Stress can undermine the concentration ability, problem-solving skill, decision-making skill, and workability of construction trade artisans.<sup>[4]</sup>

Literature indicates that occupational stress among artisans is a rising concern in the construction industry.<sup>[4,5]</sup> In the Nigerian construction industry, a study revealed that construction activities are stressful to construction trade artisans.<sup>[4]</sup> Occupational stress has been found to have a direct relationship with injuries or near misses among artisans in the construction industry.<sup>[5]</sup> In a descriptive survey of 107 Nigerian construction workers from 60 construction sites, it was also found that the key sources of stress were a high amount of work, uncomfortable site/office environment, absence of feedback on previous and ongoing construction projects, and differences in the scope of work in

ongoing construction projects.<sup>[6]</sup> An evaluation study of 250 construction workers in Nigeria revealed that >70% of these workers were at increased risk of lifting-related discomfort.<sup>[7]</sup> A survey study of 105 Nigerian construction trade artisans revealed that drinking, flirting, clubbing, smoking, and quarreling were regular stressors among the artisans.<sup>[4]</sup> The results of these past studies suggest that stress is common among Nigerian construction trade artisans. Therefore, there is a need for a stress management intervention among these artisans to help them tackle occupational stress issue. The next section discusses the concept of construction trade artisans and thereafter another section explores occupational stress management among the construction trade artisans.

### 1.1. Construction trade artisans

Construction trade artisans refer to semi-skilled construction workers employed as laborers in the construction industry. They are regarded as craftsmen or tradesmen who skillfully and practically work with their hands to actualize a construction project.<sup>[8]</sup> Some examples of construction trade artisans include carpenters, electricians, bricklayers/masons, interior decorators, iron benders, painters, plumbers, steel fixers, and tilers.<sup>[4,9,10]</sup> Using a questionnaire-based structured interview for 89 artisans in different construction sites in 3 northern Nigerian states, a study revealed that about 60.67% of the artisans informally acquired their skills through on-the-job experience; 17.98% of the artisans acquired their skills through formal training in vocational schools, and 21.35% of the artisans acquired their skills through apprenticeship system.<sup>[9]</sup> Thus, the majority of the artisans were found to have acquired their skills through the informal method.<sup>[9]</sup> In a bid to tackle the problem of shortage of Nigerian artisans with requisite technical skills and craftsmanship in the construction industry, the federal government, through the Industrial Training Fund provided funds to develop the skills of young Nigerians in this sector.<sup>[11]</sup> The government hopes that the funds will be used to provide training to young Nigerians in vocational trades and crafts such as welding and fabrication, reinforcing metal works, domestic electrical installation, carpentry and joinery, tiling, masonry, block and brick making, plumbing and pipefitting, plastering and plaster of Paris installation.<sup>[11]</sup> Besides this effort by the government, the mental health of the construction trade artisans seems to be neglected as there is no evidence of programmes aiming to improve their mental health at the workplace. Construction work can negatively affect artisan's mental health and workplace wellbeing in the form of stress as they aim to accomplish construction project satisfactorily.<sup>[12]</sup> The next section explores the management of stress among construction trade artisans as earlier stated.

### 1.2. Occupational stress management

Stress management training using cognitive behavioral intervention (CBI) is considered a practical approach for improving stress management skills and reducing stress symptoms in diverse client populations.<sup>[13–17]</sup> Effectively managing stress can enable individuals to minimize worry and stress and maintain general health.<sup>[18]</sup> Researchers have argued that since construction workers are one of the occupational groups that are most susceptible to occupational stress, the need to identify and reduce stress among them should not be overlooked.<sup>[4,5]</sup> Since artisans are responsible for handling the construction materials which

represents about 60% of the construction project costs, they should be emotionally stable to be able to carry out their tasks efficiently.<sup>[4]</sup> Some construction trade artisans in Nigeria uses aerobic method, biofeedback, relaxation technique, laughter, and social support as means of managing their stress and maintaining emotional stability.<sup>[4]</sup>

Cognitive behavioral intervention (CBI) can equip artisans with skills to identify and modify their dysfunctional thoughts at work which often negatively affect their behaviors and emotions. Among the various interventions that have also been developed to assist the working populations in coping with occupational stress, CBI has shown promising evidence. For example, a study of CBI delivered to 70 teaching staff and compared with a waitlisted group of 54 teaching staff revealed that it resulted in reports of less job-related stress, reduced dysfunctional thoughts and enhanced stress management behaviors among the participants after the intervention.<sup>[19]</sup> The use of CBI for stress management is based on the philosophy that individuals' dysfunctional thoughts do influence their cognitive and behavioral response to stressful situations. Managing stress can start from altering how the individual examines or responds to the situation.<sup>[2]</sup> Thus, during CBI, engaging individuals to assess the logic of their dysfunctional thoughts and develop unbiased and conceptual thinking relatable to their personal experiences of a problem is 1 technique that can be adopted to help modify individuals' dysfunctional thoughts.<sup>[20]</sup> Also, assisting individuals in recognizing the consequences of withholding their dysfunctional thoughts and the possible gains of modifying such thoughts is another technique that can be used to alter individuals' dysfunctional thoughts.<sup>[20]</sup> Following the potentials of CBI, the current study applied it as a stress management strategy to assist construction trade artisans in the building construction sector to manage occupational stress.

### 1.3. Study objective

The present research aimed to investigate the effect of cognitive behavioral intervention on occupational stress among Nigerian construction trade artisans in the building construction sector.

## 2. Methods

### 2.1. Compliance with research ethics

This randomized controlled trial was approved for the researchers by the Faculty of Vocational and Technical Education Research Committee, University of Nigeria, Nsukka. All participating artisans completed an informed consent form. This research complied with the ethical principles for conducting human research as suggested by the American Psychological Association.

### 2.2. Study setting

This study was conducted in southeast Nigeria which has indigenous and multinational building construction firms situated across the states. There are 5 states within southeast Nigeria. These are Abia state, Anambra state, Ebonyi state, Enugu state, and Imo state.

### 2.3. Study participants

The study participants comprised 140 construction trade artisans divided into 2 groups—the CBI group (n=70) and the waitlist

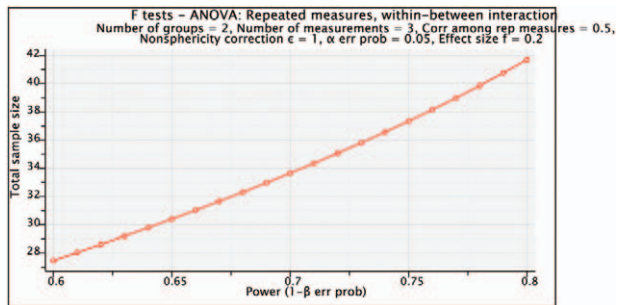


Figure 1. G-power analysis for sample size determination.

control group (n=70). Figure 1 shows the group randomization process. The research sample size was deemed adequate through a priori power analysis using G\*Power for sample size calculation.<sup>[21]</sup> Our sample size surpasses the a priori sample size. According to Bartlett,<sup>[22]</sup> a priori power analysis should be performed if the researcher (s) want to confirm the number of participants required to detect a specific effect in a study. Figure 2 shows the sample size calculation by G\*Power. With the random allocation software (RAS) program,<sup>[23]</sup> a random allocation

sequence was generated to curtail participants’ selection bias. Through the use of sealed envelopes, opaque, sequentially numbered, and pressure-sensitive paper, we applied the sequence<sup>[24]</sup> and masked the allocations until all participants were assigned to the 2 groups.

**2.4. Instrumentation**

The following self-report measurement tools were employed for data collection in this study.

A 12-item self-report questionnaire (artisans’ occupational stress questionnaire, AOSQ) developed by the researchers for assessing construction trade artisans’ occupational stress on a 7-point scale ranging from 1 (Never) to 7 (Always) with Cronbach α reliability of 0.80 was used for data collection. The mean values from moderate (4) and above signify a high occupational stress symptom.

A 15-item self-report questionnaire (artisans’ dysfunctional thoughts at work scale, ADTWS) developed by the researchers for assessing dysfunctional thoughts at work on a 7-point scale ranging from 1 (very improbable) to 7 (very probable) with Cronbach α reliability of 0.81 was also employed for data collection. The mean values from somewhat probable (3) and above signify dysfunctional thoughts at work.

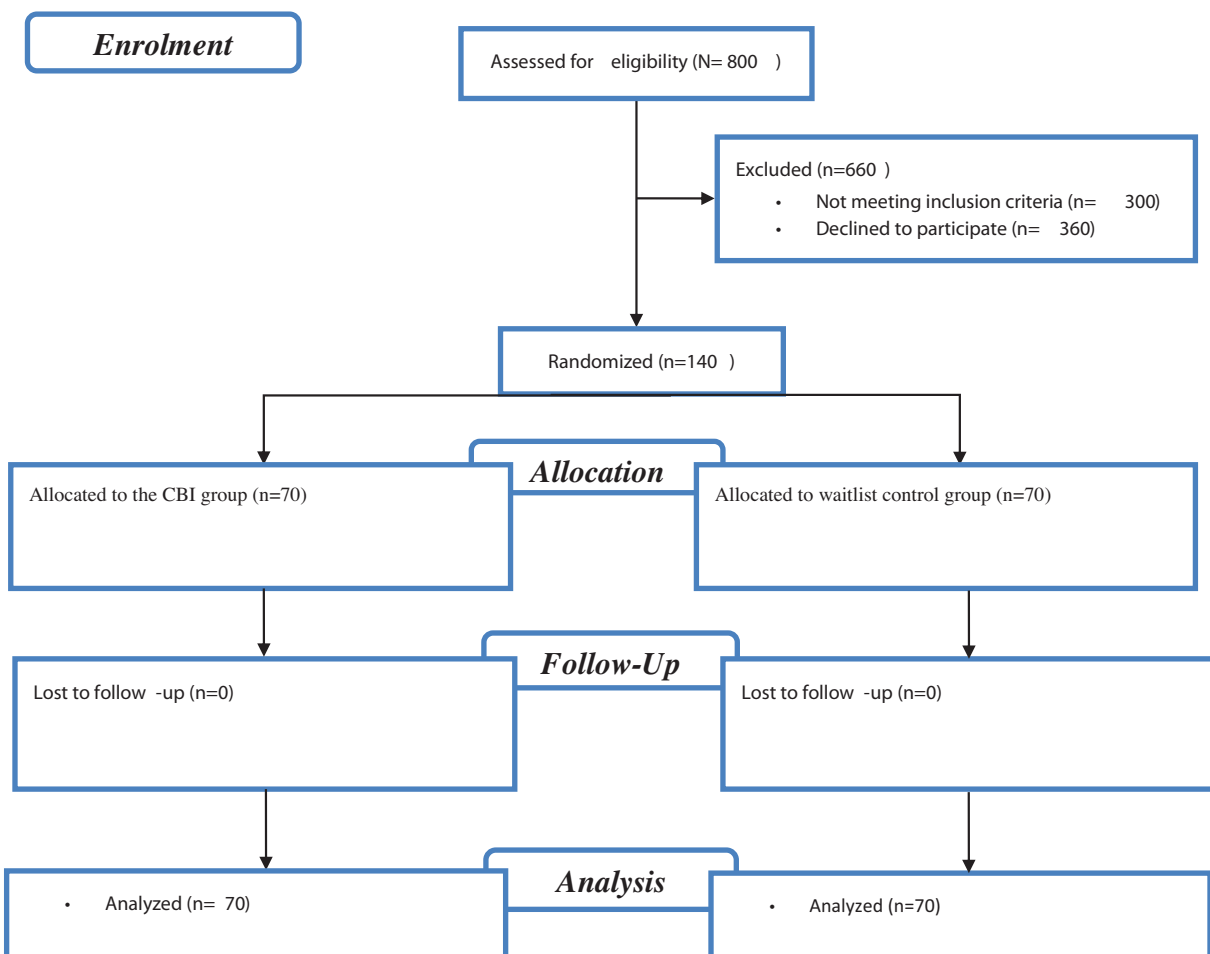


Figure 2. Participant eligibility criteria.

## 2.5. Study procedure

To screen for eligibility among potential participants, surveys were administered to 800 construction trade artisans at the start of the study in January 2019. This was made possible after a call for participation was sent out to artisans within the study area. The majority of the artisans who completed the first wave survey (81.25%) demonstrated high occupational stress symptom and dysfunctional thoughts at work. A total of 140 artisans were admitted to the second wave of study following their consent to participate. This first wave data served as pretest data (Time 1). The construction trade artisans' occupational stress level and dysfunctional thoughts at work were further assessed at 2 other points in time: posttest (Time 2) and 3-months follow-up (Time 3). The waitlist group received the CBI after the study had been completed. The medium of communication during the CBI was English and group meetings were led by 5 doctors of philosophy in counseling students who received training regarding the study protocol. The CBI sessions were held in classrooms of educational institutions closest to the participants and involved 5 small groups (14 artisans in each subgroup).

## 2.6. Experimental program

The cognitive behavioral stress management process<sup>[18,25]</sup> was adapted for use in this study to help the artisans manage their stress and dysfunctional thoughts at work. Therefore, group meetings were held weekly for 2 hours, comprising 90-minute didactic components and 30-minute relaxation training components for 10 weeks. Each treatment session provided an opportunity for group instruction in skills for stress management which involved cognitive restructuring, coping strategies including cognitive and behavioral coping strategies, assertive communication, and social support. Cognitive-behavioral approaches to stress management, informational materials related to workplace well-being and how to adapt coping strategies to specific requirements of diverse stressful events were discussed as part of the didactic components. In order to link up and elaborate contents of the sessions, the

artisans completed between-session homework assignments each week. Each week, instruction in relaxation methods, including progressive muscle relaxation, imagery, and meditation, was also provided to artisans. The artisans were also encouraged to practice relaxation skills each day. Individual members of the group were encouraged to keep a diary of any situation that aggravated their feelings of stress each day so that the thoughts surrounding the situation can be examined.

## 2.7. Treatment fidelity and compliance monitoring

Construction trade artisans' adherence to the cognitive-behavioral intervention was monitored and recorded using the number of homework assignments completed by individual participants. The construction trade artisans' attendance rates to CBI sessions were kept, and complementary sessions were held to make up for missed sessions. Integrity and behavioral checklists were used to account for therapists' compliance with components of the CBI and the construction trade artisans' adherence and satisfaction with the CBI.

## 2.8. Data analyses approach

Data analyses involved using the repeated measures analysis of variance (rmAnova) at 0.05 significance level. The analyses aimed to reveal the main effect of Group, the main effect of Time, and Group  $\times$  Time interaction effect. Given the statistical approach adopted, partial eta squared was employed as a measure of the effect size. Post-hoc analyses were conducted using Sidak. Levene test of equality of error variances showed that the assumption of homogeneity of variances was not violated. Also, Mauchly test for sphericity showed that the assumption of sphericity was met. Demographic data of participants in the 2 study groups were examined using Chi-squared and *t* test statistics.

## 3. Results

Table 1 shows that there were no significant differences in the participants demographics such as qualification ( $\chi^2 [3]=0.334$ ,

**Table 1**

### Participants' demographic variables.

Demographics of participants		Treatment group n (%)	Control group, n (%)	$\chi^2$	<i>P</i>
Qualification	Primary Certificate	21 (8.6)	20 (28.6)	0.334	.954
	Secondary Certificate	30 (42.9)	32 (45.7)		
	Diploma Certificate	14 (20.0)	12 (17.1)		
	Degree Certificate	5 (6.9)	6 (8.6)		
Age	20–30 yrs	21 (30)	21 (30)	0.236	.994
	31–40 yrs	19 (27.1)	17 (24.3)		
	41–45 yrs	15 (21.4)	15 (21.4)		
	Above 45 years	15 (21.4)	17 (24.3)		
Method of skill acquisition	Formal Vocational Training School	11 (15.7)	9 (12.9)	0.898	.638
	Apprenticeship	40 (57.1)	37 (52.9)		
	On-the-job experience	19 (27.1)	24 (34.3)		
Skill acquired	Mason/bricklayers	4 (5.7)	5 (7.1)	2.254	.944
	Carpenters	16 (22.9)	14 (20.0)		
	Iron benders	13 (18.6)	20 (28.6)		
	Tilers	4 (5.7)	2 (2.9)		
	Electricians	17 (24.3)	16 (22.9)		
	Plumbers	5 (7.1)	4 (5.7)		
	Painters	7 (10.0)	5 (7.1)		
	Interior decorators	4 (5.7)	4 (5.7)		

**Table 2**  
Means, standard deviations and rmAnova statistics for artisans' occupational stress and dysfunctional thoughts.

Variables	CBI group		Waitlist control group		rmAnova				
	M	SD	M	SD	Effect	F-ratio	df	$\eta_p^2$	95% CI
AOSQ									
Time 1	75.01	6.41	75.24	6.40	G	751.60*	1138	0.85	[74.06, 76.19]
Time 2	27.07	5.23	56.88	6.98	T	1488.53*	2276	0.92	[40.95, 43.01]
Time 3	26.05	5.62	55.10	7.90	G × T	276.70*	2276	0.67	[39.43, 41.72]
ADTWS									
Time 1	94.62	8.62	94.62	8.62	G	2034.50*	1138	0.94	[93.19, 96.07]
Time 2	29.84	5.23	92.62	7.68	T	1312.43*	2276	0.90	[60.14, 62.34]
Time 3	29.27	5.37	91.64	8.81	G × T	1125.48*	2276	0.89	[59.24, 61.68]

N=125; M=mean; SD=standard deviation; G=group; T=time; G × T=group × time interaction; CI=confidence interval.  
AOSQ=artisans' occupational stress questionnaire, ADTWS=artisans' dysfunctional thoughts at work scale.  
\* P < .05.

P=.954), age ( $\chi^2$  [4]=0.236, P=.994), skill acquisition method ( $\chi^2$  [2]=0.898, P=.638), and construction skills acquired ( $\chi^2$  [7]=2.254, P=.944).

**3.1. Construction trade artisans' occupational stress**

Table 2 shows the results for construction trade artisans' occupational stress scores by group and time. As shown, pretest occupational stress scores were similar for artisans in the treatment group (M=75.01, SD=6.41) and control group (M=75.24, SD=6.40). The results also revealed a significant effect of group on construction trade artisans' occupational stress scores, F(1, 138)=751.60, P<.05,  $\eta_p^2$ =0.85. Post hoc analysis indicated that the construction trade artisans in the treatment group (M=27.07, SD=5.23) experienced a significant decrease in occupational stress scores compared with artisans in the waitlist control group (M=56.88, SD=6.98) (P<.05) (see Table 3).

The results also indicated that there was a statistically significant effect of time on construction trade artisans' occupational stress scores, F(2, 276)=1488.53, P<.05,  $\eta_p^2$ =0.92 (see Table 2). Post hoc analysis illustrated statistically significant changes in CBI group participants' occupational stress scores across the time points (Ps<.05) (see Table 4).

The results further show that there was a statistically significant group × time interaction effect on the construction trade artisans' occupational stress scores, F(2, 276)=276.70, P<.05,  $\eta_p^2$ =0.67 (see Table 2). Figure 3 is a graphical presentation of the interaction effect of group and time on construction trade artisans' occupational stress scores.

**Table 3**  
Post-hoc tests with Sidak by group for artisans' occupational stress and dysfunctional thoughts.

Variables	(I) Groups	(J) Groups	MD (I-J)	95% CI
AOSQ				
	Treatment	Control	-19.69*	[-21.12, -18.28]
	Control	Treatment	19.69*	[18.28, 21.12]
ADTWS				
	Treatment	Control	-41.72*	[-43.55, -39.89]
	Control	Treatment	41.72*	[39.89, 43.55]

AOSQ=artisans' occupational stress questionnaire, ADTWS=artisans' dysfunctional thoughts at work scale, CI=confidence interval, MD=mean difference.  
\* P < .05 based on Sidak test.

**3.1.1. Construction trade artisans' dysfunctional thoughts.**

Table 2 shows the results for construction trade artisans' dysfunctional thoughts at work by group and time. As shown, pretest scores for construction trade artisans' dysfunctional thoughts at work were similar for the treatment group (M=94.62, SD=8.62) and control group (M=94.62, SD=8.62). The results further showed a significant effect of group on construction trade artisans' dysfunctional thoughts at work, F(1, 138)=2034.50, P<.05,  $\eta_p^2$ =0.94. Post hoc analysis indicated that the CBI group participants (M=29.84, SD=5.23) had a significant reduction in dysfunctional thoughts at work scores compared to the waitlist control group participants (M=92.62, SD=7.68) (P<.05) (see Table 3).

The results also show a statistically significant effect of time on the construction trade artisans' dysfunctional thoughts at work, F(2, 276)=1312.43, P<.05,  $\eta_p^2$ =0.90 (see Table 2). Post hoc analysis illustrated statistically significant changes in CBI group participants' dysfunctional thoughts at work across the time points (Ps<.05) (see Table 4).

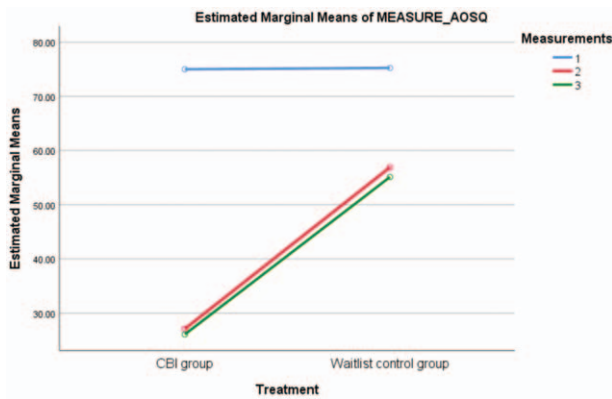
The results further show that there was a statistically significant group × time interaction effect on construction trade artisans' dysfunctional thoughts at work, F(2, 276)=1125.48,

**Table 4**  
Post-hoc tests with Sidak by time for artisans' occupational stress and dysfunctional thoughts.

Variables	(I) Time	(J) Time	MD (I-J)	95% CI
AOSQ				
	Time 1	Time 2	33.15*	[31.27, 35.03]
		Time 3	34.55*	[32.61, 36.49]
	Time 2	Time 1	-33.15*	[-35.03, -31.27]
		Time 3	1.40†	[0.08, 2.72]
	Time 3	Time 1	-34.55*	[-36.49, -32.61]
		Time 2	-1.40*	[-2.72, -.08]
ADTWS				
	Time 1	Time 2	33.39*	[31.25, 35.53]
		Time 3	34.17*	[31.87, 36.47]
	Time 2	Time 1	-33.39*	[-35.53, -31.25]
		Time 3	0.78*	[0.25, 1.30]
	Time 3	Time 1	-34.17*	[-36.47, -31.87]
		Time 2	-0.78*	[-1.30, -0.25]

AOSQ=artisans' occupational stress questionnaire, ADTWS=artisans' dysfunctional thoughts at work scale, CI=confidence interval, MD=mean difference.  
\* P < .05 based on Sidak test.



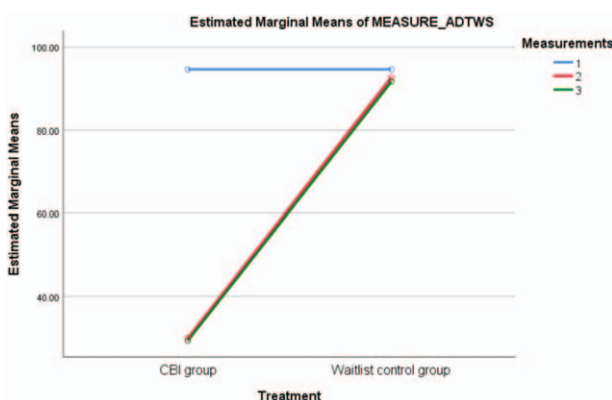


**Figure 3.** Graphical presentation of the interaction effect of group and time on participants' occupational stress level.

$P < .05$ ,  $\eta_p^2 = 0.89$  (see Table 2). Figure 4 is a graphical presentation of the interaction effect of group and time on construction trade artisans' dysfunctional thoughts at work.

#### 4. Discussion

The main objective of this research was to examine the effect of cognitive behavioral intervention on occupational stress among Nigerian construction trade artisans in the building construction sector. Our finding revealed that there were significant effects of group on construction trade artisans' occupational stress and dysfunctional thoughts at work. Also, there were significant effects of time on construction trade artisans' occupational stress and dysfunctional thoughts at work. Finally, group  $\times$  time interaction effects on construction trade artisans' occupational stress and dysfunctional thoughts at work were significant. These findings imply that cognitive behavioral intervention is effective for managing occupational stress and dysfunctional thoughts at work among Nigerian construction trade artisans. The current study findings support previous cognitive behavioral interventions which revealed that it is an effective strategy for improving stress management skills and reducing stress symptoms in people.<sup>[13–17,26]</sup> Also, the positive results of a previous study that utilized both cognitive and behavioral techniques in the treatment of work-related stress<sup>[27]</sup> provide supports for the



**Figure 4.** Graphical presentation of the interaction effect of group and time on participants' dysfunctional thoughts at work.

current study findings. Another study comparing cognitive behavioral intervention with yoga demonstrated that both strategies are effective for managing stress in a corporate setting<sup>[28]</sup> gives credence to our recent findings. Another study involving 446 participants in the treatment group and 116 participants in the control group which found that cognitive behavioral intervention can improve workers' well-being, including improvement in stress coping ability<sup>[29]</sup> also support our findings. The results of a cognitive behavioral treatment of work-related stress (between-group effect, Cohen  $d = 0.6$ ) among 239 participants who were assigned randomly to a treatment group ( $n = 177$ ) or waitlist group ( $n = 62$ )<sup>[30]</sup> supports our current study findings. A previous study utilizing a single group design reported that group cognitive behavioral intervention effectively reduced participants' negative beliefs<sup>[31]</sup>; similarly, our present study results suggest that cognitive behavioral intervention significantly reduced dysfunctional thoughts at work among construction trade artisans. Our findings are also in line with a previous cognitive behavioral intervention which showed that the participants reported less work-related stress and reduced dysfunctional thoughts after exposure to CBI.<sup>[19]</sup>

Since cognitive behavioral intervention is shown to be a promising intervention for stress management among construction trade artisans, adequate consideration should be given to it by construction firms aiming to improve their workers' mental health. Construction trade artisans suffering from work-related stress but have not been opportune to engage in a cognitive behavioural stress management intervention may seek help from a licensed cognitive behavioural therapist. Artisans' dedication to practice stress management skills on daily basis during the intervention is essential and should be encouraged. Our present study findings could serve as a good motivator for future trials to investigate the effectiveness of cognitive behavioral intervention as a stress management technique among other groups of workers in the construction sector. This is indispensable because occupational stress appears to affect not only artisans but also other professionals in the construction industry.<sup>[32]</sup> We hope that researchers would continue to intensify their efforts towards providing both occupational stress prevalence data and cognitive behavioral treatment for occupational stress among different group of workers in the construction industry. As cognitive behavioral intervention is known to help manage other mental health issues such as depression and anxiety,<sup>[33]</sup> efforts could be directed at applying it to attain similar mental health goals among artisans.

The following limitations of our study should be addressed in the future: since our sample comprised only construction trade artisans, the generalization of our findings to other groups in the construction industry is not possible. Also, since the period of follow-up was limited, understanding the long term efficacy of the cognitive behavioral intervention as a stress management technique was not possible. Therefore, additional research and replication of this study are needed to tackle these limitations. Also, expanding our research to explore how cognitive behavioral intervention can reduce occupational stress and promote occupational commitment, success, health, and wellness can be fruitful.

#### 5. Conclusion

Cognitive behavioral intervention is a promising intervention for managing occupational stress and dysfunctional thoughts at work among Nigerian construction trade artisans in the building

construction sector. Therefore, it is suggested that cognitive behavioral intervention should be given priority by construction companies aiming to improve their workers' mental health.

### Author contributions

**Conceptualization:** Hyginus Osita Omeje, Godwin Okereke, Japel Onyekachi Asogwa, Pauline Ijeoma Obe, Samson Ikenna Nwaodo, Samson Oluwatimilehin Ariyo, Victor Arinzechukwu Okanya, Deborah Ahuoiza Vincent, Daniel Uchenna Chukwu, Joshua Onyedikachi Ike, Kingsley Chimezia Udogu, Christian Sunday Ugwuanyi, Mary Aneke.

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