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Managing job stress among teachers of children with autism spectrum disorders
A randomized controlled trial of cognitive behavioral therapy with yoga

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Abstract

Background: Job-related stress undermines occupational, personal, and organizational outcomes. Stress symptoms are common among teachers of children with autism spectrum disorders and affect the academic progress of the children. This study investigated the effectiveness of yoga-based cognitive behavioral therapy in reducing occupational stress among teachers of children with autism in Lagos states, Nigeria.

Methods: The current study adopted a group-randomized waitlist control (WLC) trial design with pre-test, posttest, and follow-up assessments. Participants included 58 teachers of children with autism in public and private special schools in Lagos state. Participants were randomly assigned to combined cognitive behavioral therapy and yoga (Y-CBT) (N = 29) and WLC (N = 29) groups. The Y-CBT group participated in a 2 hours Y-CBT program weekly for 12 weeks. Three instruments – Demographic Questionnaire, Single-Item Stress Questionnaire, and Teachers' Stress Inventory (TSI) were used to collect data. Data were collected at baseline; posttest and follow-up evaluations. Data were analyzed using means, standard deviations, t test statistics, repeated measures analysis of variance, and bar charts.

Results: Results revealed that all dimensions of job stress (perception of stress sources, stress manifestation, and total TSI scores) reduced significantly at posttest and follow up assessments among the Y-CBT group, compared to the WLC.

Conclusion: It was concluded that Y-CBT modalities could help to minimize the perception of stress sources and stress manifestation as well as total TSI scores among teachers of children with autism spectrum disorders.

Abbreviations: ABCDE = Activating Event, Beliefs, Consequences, Disputation and Effective World View, ASD = autism spectrum disorders, CBT = cognitive behavioral therapy, CI = confidence interval, Df = degree of freedom, F = analysis of variance test statistic, M = mean, n = sample, $ŋ^2$ = partial Eta squared (effect size), P = probability value, SM = stress manifestation, SS = stress sources, t = t test statistic, TSI = Teachers' Stress Inventory, WLC = waitlist control, WLG = waitlist group, Y-CBT = combined cognitive behavioral therapy and yoga.

Keywords: cognitive behavioral therapy, health, job-stress, well-being, yoga

1. Introduction

Occupational experience accounts for heightened stress-related health issues all over the world.[1] Teaching profession is one of the most stressful occupations all across the globe.[1–4] Compared to other professionals, teachers are rated one of the employees most affected by stress.[5,6] In Nigeria, high level of occupational stress has been documented of teachers at all level of education and context.[7,8] Those teaching children with special education

needs are more susceptible to the dehumanizing effect of stress.[9–11] Teachers of children with autism spectrum disorders (ASD) are more likely to experience elevated stress compared to teachers of the typically developing children, or children with other disabilities.[12,13] This could be due to work demands associated with the impairments of the children in the spectrum. For instance teachers of children with ASD are required to carry out extra assignments such as adapting curriculum materials, and environment to suit the children.[13,14] Furthermore, teachers' lack of training/skills and poor self-efficacy for teaching the children[12] are additional sources of stress.

Additionally, autism conditions are characterized by social and behavioral difficulties together with stereotyped repetitive behaviors.[15,16] Maladaptive behaviors associated with ASD disorders and heterogeneity of ASD spectrum may threaten teachers' sense of efficacy leading to the feeling of stress.[12,14–16] Reduction in stress will increase teachers' performance,[17,18] promote retention and better social relationships[18]; and reduce sick leave and absenteeism.[17–19] This study used a combination of cognitive behavioral therapy (CBT) and yoga in the form of stress management to reduce stress among teachers of children with ASD.

CBT is a psychotherapeutic treatment found to be effective in modifying everyday behavior. Within the core premise of the CBT intervention approach as reported by Onyishi et al[20] is dealing with maladaptive cognitions which include general belief or schemas that give rise to specific and automatic thoughts in a person in a particular situation. The theory of CBT emphasizes the Activating Event, Beliefs, Consequences, Disputation and Effective World View (ABCDE) model.[21,22] This model holds that certain critical incidents or situations (A) activate schema, or internalized thought patterns (B) which could be adaptive or maladaptive. When this occurs, it is the maladaptive cognition, not the event that will lead an individual to experience negative emotional distress (C) which reduces the individual's capacity of functioning. CBT addresses this by helping the individual to identify and dispute (D) misconceptions and unhelpful beliefs about the event and develop new conceptions about the situation (E) hence, developing new behavioral responses to stressful invents.[21,22] CBT uses some specific techniques like disputation, cognitive restructuring, problem-solving, relaxation, and home-work assignment.[4,23]

Evidence-base studies attest to the effectiveness of CBT in the treatment of mental illnesses such as stress.[24] Extant studies have attested to the efficacy of CBT in promoting the quality of life of individuals with psychiatric disorders, even with very high rates of co-mobility.[25–27] CBT is a structured time-limited and cost-effective therapeutic approach to current problems.[25–28] Despite the efficacy of CBT so far, it is recommended to complement psychotherapy like CBT with yoga in the treatment of psychosomatic symptoms of mental health issues such as stress.[29]

Yoga is an alternative and complementary treatment used in reducing psychosomatic challenges including stress.[30] Yoga is a form of exercise that integrates the mind, spirit, and body to promote the wellbeing of individuals. Historically, yoga is an ancient Indian practice focusing on physical and breathing exercises that combines relation, mediation, and physical workout.[31,32] Yoga is a therapeutic approach that brings in concert bodily and psychological that could assist one to attain physical and mental peacefulness. Yoga is intended to increment the conservative treatments for clients with an assortment of

mental health disarray, by linking physical and mental exercises.[32–35]

There are different types of yoga one of which is Hatha yoga, which is recommended for stress management. Hatha is one of the most commonly used yoga styles for beginners. It utilizes specific techniques, such as poses, breathing, meditation, and relaxation. Yoga philosophy as evinced by Woodyard[33–36] is based on 8 limbs that are referred to as ethical principles for meaningful and purposeful living. Experiments have shown yoga to be as effective as a drug when it comes to psychosomatic disorders.[36] Yoga practice is an invaluable technique for managing stress-related illnesses such as anxiety, depression, and burnout.[32–36]

Yoga has also been found to help to improve psychological health factors such as worry and rumination that impact physical health.[38] It also impacts positively on body image and mood[14,38] and can create balance for physical, emotional, mental, and spiritual capacities and reduce the risk of cardiovascular diseases.[38,39] Further, yoga techniques impact metabolic syndrome and associated musculoskeletal disorders.[40] Yoga is used as an alternative health practice to prevent stress because of its efficiency in relieving health challenges.[41] Yoga is used as both a complementary therapy and a separate treatment.[35–39,41] In this study, we adopted a complementary approach to combine yoga with CBT in minimizing stress in teachers of children with ASD.

Some researchers differ in their opinion of using CBT as 1 single technique in the treatment of psychosomatic disorders such as stress.[29] Karatzias et al[42] reported that though CBT skills are effective for psychological outcomes, muscle relaxation techniques were more effective for more positive outcomes. As CBT focuses on changing attitudes and belief systems contributing to stress, a combination of other techniques that could have mind-body effects are required for enhanced outcomes.[29,43] Thus using yoga to complement the CBT intervention for stress could maximize the effectiveness of intervention by taking care of both mental and somatic aspects of symptoms. Shreds of evidence abound affirming the invaluable benefits of complimenting combined cognitive behavioral therapy and yoga (Y-CBT) for heightened outcomes.[33,35,44–48] Out of these studies, none has used Y-CBT in the treatment of stress among teachers of children with ASD.

We expanded research by using Y-CBT to help this group of teachers of children with ASD. We, therefore, hypothesize that by the completion of the Y-CBT intervention program, there will be a significant reduction in participants' stress compared to baseline assessment and that this reduction would be sustained across 3 months follow-up.

2. Methods

This session deals with the research procedure. Figure 1 shows the procedure and methodology for carrying out the present study.

3. Design

The current study adopted a double-blinded group-randomized waitlist control (WLC) trial design with pre-test, posttest, and follow-up assessments.[49] This design has 3 distinct features that help to strengthen the validity of the study outcomes. First, it is double-blinded, meaning that both the participants and the investigators are unaware of who is getting the intervention and
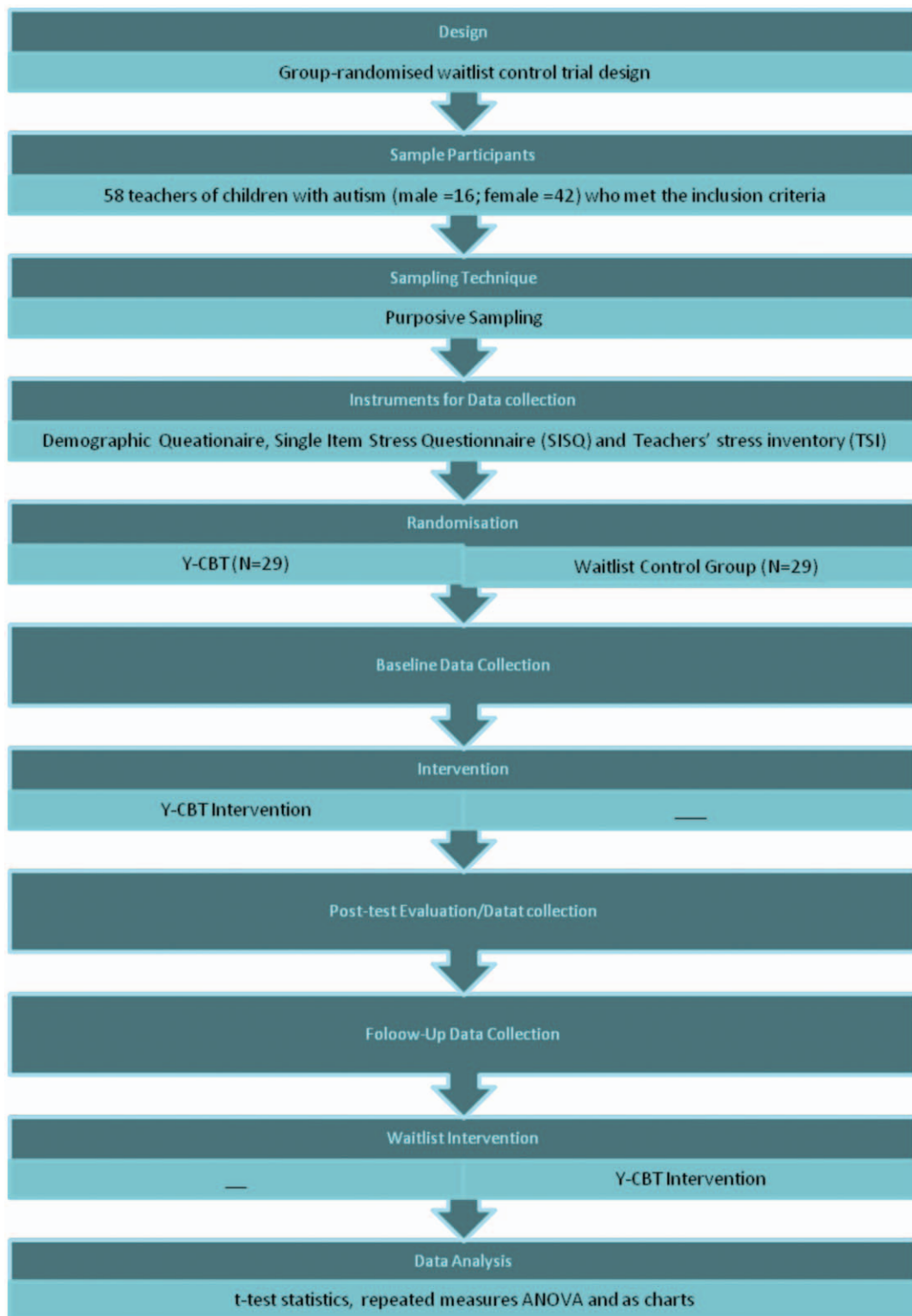
Figure 1. Flowchart showing research methodology. The figure indicates that a group randomized waitlist control design was used for the study. Randomization grouped 29 participants each into Y-CBT and control groups. Baseline data were collected from both groups, after which Y-CBT group received intervention. Thereafter, postintervention data were collected, followed by a 3-months follow-up, intervention for the waitlisted participants and then data analyses. Y-CBT = combined cognitive behavioral therapy and yoga.

who is not before the commencement of the intervention. Further, neither researchers, nor the participants were aware of whether the next eligible participant will be receiving treatment or control intervention. This helped to eliminate the bias of unconscious information.[49] Secondly, it is group-randomized, suggesting that the groups (intervention and WLC) were based on simple

random allocation, and were not labeled prior to participant's randomization.[49] Thirdly, the control group was waitlisted, in the sense that the control group crossed over to receive intervention after the posttest evaluations. This was intended to eliminate the ethical bias of leaving the participants in the control group in their deficient health state after the investigation.[50,51] This design guided the researcher to assess the effectiveness of Y-CBT intervention on job-stress. Participants were randomized into Y-CBT and WLC groups (see Fig. 1).

3.1. Ethical consideration

The full trial protocol for study was approved by the Faculty of Educational research ethics committee, University of Nigeria, Nsukka, Nigeria. The study also complied with the research ethical standard as specified by the American Psychological Association [50] and the World Medical Association.[51] All the study participants signed written consent before participating in the study. The trial protocol for study was also registered in the AEA RCT Registry and the unique identifying number is: "AEARCTR-0006682".

4. Measures

4.1. Demographic questionnaire

This was meant to obtain information about the participants' demographic variables including age, gender, years of experience, and qualification. The participants were instructed to tick the appropriate option as it may apply to him or her.

4.2. The Single-Item Stress Questionnaire

This single-item measure of stress symptoms was used as one of the inclusion/exclusion criteria for the study. The instrument has consistently been found valid and reliable in stress researches[52,53] showing Chrombach reliability indices ranging from 0.80 to 0.86. The instrument reads: "stress means a situation when a person feels tense, restless, nervous, anxious, or unable to sleep at night because his or her mind is troubled all the time. Do you feel that kind of stress these days?" The Single-Item Stress Questionnaire is measured I 5-point scale ranging from 1-"not at all" to 5-"very much". In this study, scores ranging from 1 to 2 indicate low stress; 3 indicates moderate stress; while 4 to 5 indicate a high- stress level. The researcher found a Chronbach Alpha reliability index of 0.79 among 20 adult workers in Nigeria for Single-Item Stress Questionnaire.

4.3. The Teachers' Stress Inventory

Teachers' Stress Inventory (TSI)[54] is a 49-item questionnaire rated on a 5-point Likert scale. The TSI assesses stress in 10 subscales, covering 2 major components of stress (stress sources [SS] and stress manifestations [SM]). Five subscales, including time management, work-related stressors, professional distress, discipline and motivation, and professional investment measures SS. Five subscales of emotional manifestations (such as anxiety, depression, etc), fatigue manifestations (e.g., changes in sleep, exhaustion, etc), cardiovascular manifestations (blood pressure, heart rate, etc), gastronomical manifestations (stomach pains, cramps, etc), and behavioral manifestations (use of prescription drugs/alcohol, sick leave, etc) measure SM. The TSI has been found with a good psychometric property in South Africa.[55,56]

To establish the usability of the instrument among special educators in Nigeria, the TSI was trial-tested in 43 teachers of children with ASD. Data collected were subjected to Cronbach alpha statistic and yielded a good reliability coefficient ($\alpha = .73$).

4.4. Participants, sampling, and procedure

A total of 58 teachers who teach children with autism male (n = 16) and female (n = 42). All the 67 potential participants who responded to the invitation to participate in the study were screened for eligibility against inclusion criteria set by the researchers. Participants were included based on the inclusion criteria: the participant must score up to 3 to 5 in the Single-Item Measure of Stress Symptoms, showing moderate to high-stress level; the teacher must have been employed in a Special Education school for not less than 1 year; participant must possess personal smartphones with a functional email address and connected to Whatsapp; participant is willing to submit personal contacts and phone numbers; teacher signed a written consent that he/she will be available for 2 hours a day in a week for the intensive intervention face-to-face and online modules; participant has not been diagnosed with any major psychological disorders, such as depression or anxiety disorders; participant is not having any chronic medical cases or terminal illnesses. Volunteers who did not meet the criteria were excluded from the research.

At the first stage of the sampling (March 2019–April 2019), the researchers with 4 trained research assistants visited 15 public and private Special Education schools in Enugu state Nigeria to notify them of the intervention program. At each visit, they explained stress associated with work and how it can affect the health of the workers. Also, the Y-CBT program and how it can be beneficial to them in their work and well-being were explained. Thereafter, the teachers were invited to the screening exercise. A total of 67 teachers volunteered to participate in the program (Fig. 2).

Out of 67 volunteers who were screened for eligibility. Seven (7) volunteers were excluded based on not meeting the inclusion criteria, and two (2) volunteers declined to participate. The 58 potential participants who met all the inclusion criteria were randomly assigned to Y-CBT group (n = 29) and WLC group (n = 29) (see Fig. 3). To validate the sample of the study, we estimated the sample size using power analysis which showed that the sample was adequate (see the result session) to arrive at ethically and scientifically valid study outcomes.

Randomization was conducted by the researchers using version 7 sequence allocation software (participants were asked to pick 1 envelope containing pressure-sensitive paper labeled with either blue or red) from a container. Colors were used to randomize the participants into groups first to ensure allocation concealment and double-blinding. Information about randomization was concealed from both investigators and the participants until the intervention was assigned. After the randomization of all the eligible participants into blue and red groups, a simple random sampling (a flip of coin) was used to assign the 2 groups into intervention (Y-CBT) and WLC groups. For good communication about the stages of the intervention, the researchers with the help of one of the research assistants opened 2 WhatsApp chat groups and added the participants according to the groups they were allocated to.

Thereafter, the baseline evaluation was conducted for participants in both the Y-CBT group and the waitlist group (WLG) (Time 1), using TSI. The researchers with the participants
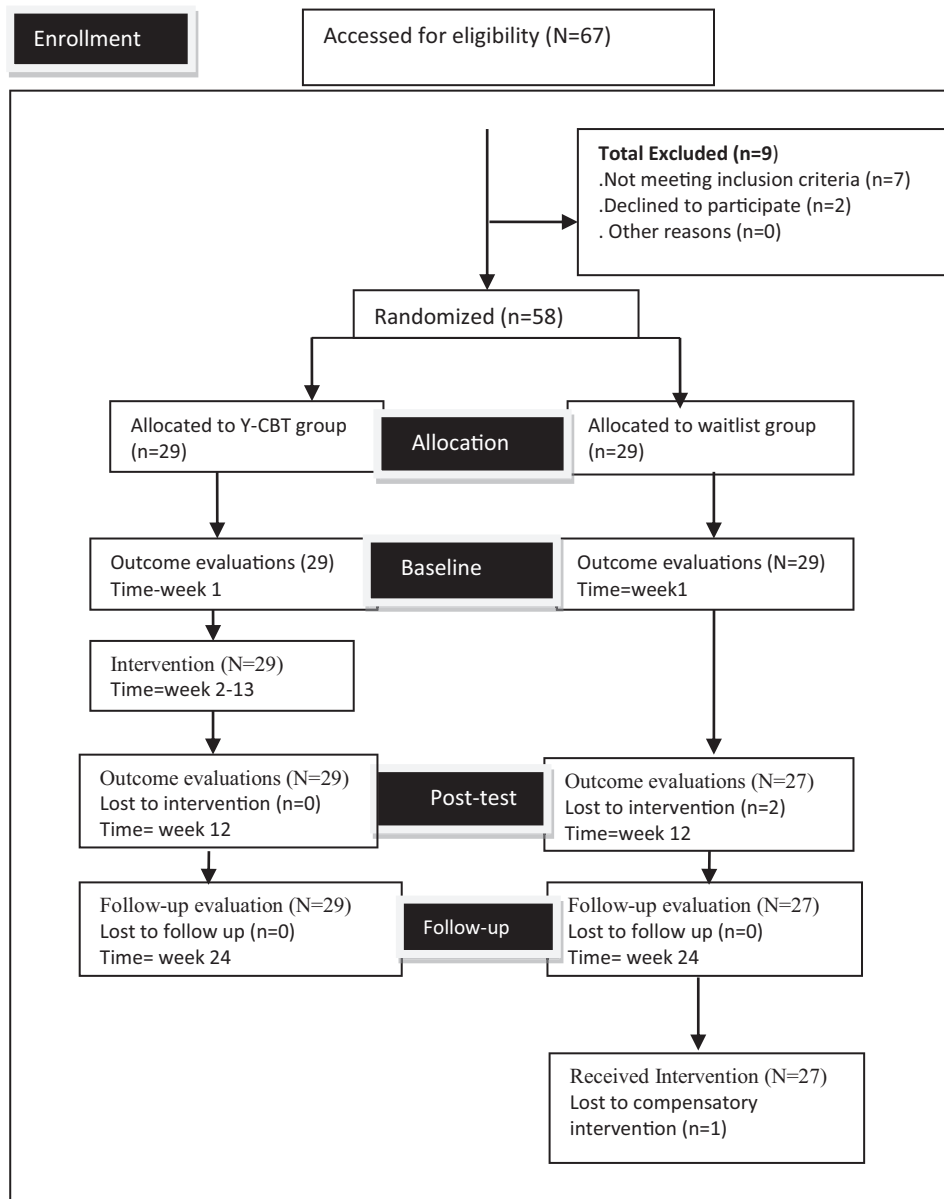
Figure 2. CONSORT Diagram.

in the Y-CBT group scheduled for commencement of the intervention. At the fourth stage, participants in the Y-CBT group received a 2 hours Y-CBT intervention once a week for 12 weeks (see intervention sessions). To ensure participants' compliance, the researcher gave financial reinforcement to the participants, covering their transport and data bundle every month to enable them to participate in intervention sessions. Each session was followed by a practice exercise by the participants.

At the fifth stage, posttest (Time 2) data were collected from both Y-CBT and WLG using TSI. Further, a follow-up meeting was held at 3 months for updates and the collection of follow-up data (Time 3). The same instrument (TSI) was used to collect 3 months follow-up (Time 3) (see Fig. 1). Finally, immediately after the 3 months follow-up assessment, the intervention program commenced for the WLG (July–September, 2019). This followed the same procedure used for the Y-CBT group.

The Y-CBT intervention was delivered and moderated by 2 of the researchers who are experts in CBT and a hired yoga expert, in collaboration with 4 research assistants (2 experts in occupational therapy). All the research assistants were remunerated by the researchers. Reminder messages were sent via the WhatsApp platform to the participants a day to each scheduled time, and early morning hours on each day of intervention meeting to ensure participants' active participation in the intervention sessions. All interventions and evaluations took place in a school hall central to all the participants. Data collected from the Y-CBT group at each assessment were compared to that from the WLC group.

4.5. Participants demographic information

Demographic data of participants in the Y-CBT group and WLG show that, generally, 16 (28%) of the participants were males,
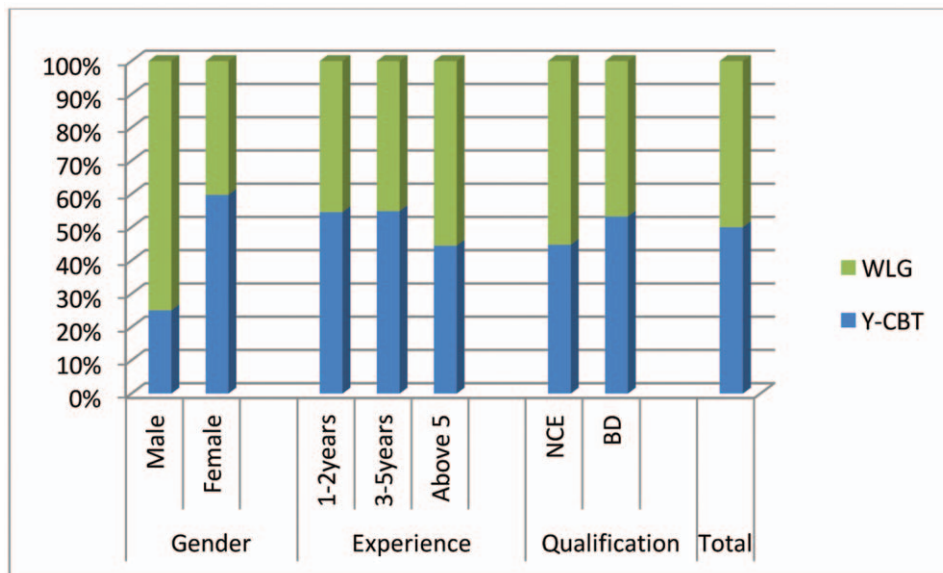
Figure 3. Bar chart representation of participants' demographic distribution across Y-CBT and WLG. BD = Bachelors' Degree, NCE = National Certificate in Education, WLG = waitlist group, Y-CBT = combined cognitive behavioral therapy and yoga.

while 42 (72%) were females. Four (7%) male and 25 (43%) female participants were in the Y-CBT while 12 (20%) male and 17 (29%) females were in the control group. Eleven (19%) and 9 (16%) of the participants in Y-CBT and WLC groups respectively had 1 to 2 years of experience; 10 (17%) and 8 (14%) in Y-CBT and WLG had 3 to 5 years of experience, while 9 (16%) and 12 (21%) also had above 5 years of experience in teaching in special schools. The mean age of the participants was 32.12 and 31.77, respectively for Y-CBT and WLG. A total of 10 (17%) and 12 (21%) had National Certificate in Education in Y-CBT and WLG, respectively; 19 (33%) and 17 (29%) participants had bachelor's degrees respectively in Y-CBT and WLG.

4.6. Intervention

A yoga-cognitive behavioral therapy program manual was developed by 2 of the researchers in collaboration with t2 experts (one in CBT and the other in yoga). In developing the manual, CBT strategies were blended with after-session yoga exercises. The CBT sessions were based on using the "ABCDE" model (antecedent/activating event, beliefs, consequences, disputing, and effective new philosophy) to identify, assess, revalidate, and change unhelpful absolutistic and irrational beliefs associated with work experiences. The major aims of Y-CBT were to use ABCDE group therapeutic model (CBT) in "disputing" – challenging and questioning teachers' work-related irrational and dysfunctional beliefs and to replace them with rather helpful and functional beliefs[57]; use yoga to reduce the physiological symptoms of stress and helping the participants out of the vicious circle of negative thoughts through yoga "Victory Meditation," affirmations ,and physical exercises.[35] This framework helped provide a targeted mind/body approach to stress perceptions, reactions, and symptoms.

The ABCDE formed the basis of explaining the relationships links between activating (A) events associated with teaching children with ASD, dysfunctional thoughts, beliefs or cognitions

arising from those events (B); the emotional and behavioral consequences of the beliefs (C).[57] Then, disputation techniques (D) are used to eliminate the maladaptive, dysfunctional, and self-limiting beliefs and cognitions.[57–59] Disputation involves challenging and comparing the maladaptive thoughts with more adaptive ones. Ellis[60] theorized that the best way to counter irrational beliefs is by considering realistic and logical ones. Hence as participants become aware of and counteract their dysfunctional beliefs, they come up with more effective world-views (E). This ABCDE model as used in earlier studies formed the basis of activities throughout the intervention (see Table 1).

Yoga complementary approaches involved after-session physical/posture exercise and meditation practices. The interaction between cognitions, emotions, and physical symptoms were highlighted and skills were taught to reduce the incongruity between sensation and perception. Traditional yoga (asanas, breathing exercises, and meditation) exercises were used in maintaining physical, mental, and emotional well-being. The traditional yoga used in this study was appropriate for beginners, given that it is mild and does not demand too much effort. The yoga intervention was meant to help participants understand and appreciate the interplay between their bodily sensations and emotional feelings. Ten different asanas poses were used, which are Tadasana (mountain pose); Vrikshasana (tree pose); Adho Mukho Svanasana (downward facing dog pose); Trikonasana (triangle pose); Kursiasana (chair pose); Naukasana (boat pose); Bhujangasana (cobra pose); Paschimottanasana; Child's Pose; and Sukhasna.[61]

Breathing exercises focused on basic breath awareness; Ujjayi Pranayama (victorious breath or ocean breath); Kapalabhati Pranayama (breath of fire or skull-shining breath); Kumbhaka Pranayama (breath retention), Nadi Shodhana Pranayama (alternate-nostril breathing). Meditation involved getting quiet, calm, and focused; mind slows down, relaxation, and staying positive by focusing on something that brings you peace to mind as well as choosing to shed go all the negative thoughts that

Table 1

Summary of the Y-CBY intervention program.

Week/sessions		Activities	Psychological mechanisms
Week 1	Introduction and baseline testing	Establishing an alliance with the participants. Setting confidentiality rules. Collection of baseline data on the job-stress of the participants. Establish a working atmosphere with the participants. Collaborating with the participants to set intervention goals. Discussing the expectations of the intervention; discussing the therapist's and participants' responsibilities during coaching and basic rules of the CBT intervention.	Assessments, goal-setting familiarization, setting rules
2	Creating a problem list/introduction of Y-CBT	Guiding the participants to create a problem list with regards to occupational challenges associated with stress. The module is designed to help participants approach each of the problems by explaining them using the ABCDE framework. Use the CBT stress model to explain stressors. Lead participants to understand the CBT and yoga and how they can work together to complement each other in managing stress. Explaining the yoga exercises that will be used in the study.	Problem formulation/identification, discussion, clarification
Week 3	Intervention 1	Help participants to identify and refute unhelpful beliefs and orientations about their job which constitute stress. This was done by listing irrational beliefs that follow unfavorable experiences and encouraging rational beliefs and thoughts. Coaching was also geared toward reducing stress. Techniques described in the intervention program were strictly adhered to. The yoga exercise session was taken for 40 minutes after the CBT session as stated in the intervention program. Participants were given a homework assignment after each session. Participants were also encouraged to have snapshots of their personal yoga practices	Disputation; homework tasks, problem-solving, rational coping statements; Unconditional self-acceptance, Ananas.
4-5	Intervention 2 and 3	Intervention continued. Checking and discussing the completed homework assignment and yoga photos. The Therapists and the participants shared weekly experiences at the onset of each session. Further disputation of irrational belief associated with job experience and replacing them with rational ones using the ABCDE modalities and techniques. Emphases were laid in developing rational self-beliefs, rational thoughts, and practices in their jobs. Linking job stressors with associated irrational beliefs. Leading the participant to find out how the belief system affects their emotions and then weakening negative effect associated occupation. Concludes each session with a 40 minutes yoga practice. Homework assignments were given to the participants after each session.	Consequence analysis; disputation; homework tasks, discussion, cognitive-restructuring
6-7	Intervention Phase 4 and 5	Further application of CBT modalities and techniques that would develop in the participants the skills for self-monitoring. Discussing healthy practices and risk management approaches in and outside the workplace. Coaching on other traditional yoga practices that could keep the participants' healthy and effective in the workplace. Toward developing the habit of functional health practices and positive psychology in the workplace. Time management skills were also discussed and practiced. Assignments were given at the end of each session. 40 minutes of yoga practices ended the session.	Guided imagery; rationalizing techniques; reframing; relaxation- technique; hypnosis
8-9	Intervention Phase 6 and 7	Further helping the participant develop the skills for stress management and healthy thoughts as well as yoga exercises (posture, breathing, and meditation exercises). Towards developing problem-solving, rational thinking and stress management skills necessary for maintaining a healthy relationship job.	Homework assignments; decision making; physical exercise
10-11	Intervention phase	Encouraging the participant to highlight what they have gained from the program and how they are going to apply them in the future. Discussing other related personal issues and experiences associated with keeping healthy in the workplace and the gain associated. Evaluation of individual commitments during the program based on contribution to group discussions and completion of assignments.	Meditation; humor and irony; decision-making; conflict resolution
12	Conclusion and revision	Participants were encouraged to ask their questions and clarify personal experiences and life situations. Share useful gains in skills. Practice yoga exercises.	Self-evaluation, demonstrating new skills.
14th week	Post-test evaluation	Conduction posttest measurement.	Testing
3 mos	Follow-up assessment	Conducting the follow-up after 3 months of posttest	Testing

ABCDE = Activating Event, Beliefs, Consequences, Disputation and Effective World View, CBT = cognitive behavioral therapy, Y-CBT = combined cognitive behavioral therapy and yoga.

interfere with health. Meditation also helps you become more mindful of your mind and body.

Hence, in Y-CBT we designed a 12 weeks module of CBT accompanied by traditional yoga exercises as discussed above. Each session of the module includes information, exercises, worksheets, images, examples, homework exercises, and template for progress feedback.

4.7. Recruitment, response rates, attrition, and adherence

Before recruitment, we obtained informed consent from all potential participants. A total of 67 potential participants responded to the invitation to participate in the study out of which 58 participants were included in the study. Others were excluded based on not meeting the inclusion criteria and other reasons. Generally, the response and adherence rate was high and the attrition rate was low. Out of the 58 participants who were randomized for the study 56 (96.5%) completed the sessions and all evaluations, while 2 participants (3.5%) were lost to the posttest for a known reason. One lost her husband and the other was hospitalized for the orthopedic case and could not continue.

4.8. Design and data analyses

Baseline data were analyzed using t test statistics. A 2-way analysis of variance with repeated measures was used to compare baseline, postintervention, and follow-up data. Partial Eta square was used to report the effect size of the intervention on the dependent measure's dimensions. Power analysis was used to determine the sample size. A paired sample t test was used to determine the difference in participants' ratings across Time 1 and 2, as well as Time 2 and 3. Statistical Package for Social Sciences (SPSS) version 24.0 was used for analysis.[65] The results are present in tables and charts.

5. Results

We made a retrogressive estimate of the sample size using the Gpower statistical tool,[66] and the effect size was 0.33, with an alpha = 0.05 and power = 0.95 (Fig. 4).

The least possible sample size that can bring about real effect was roughly 53 for between-group comparison. This indicates that the sample of 58 is above the minimum, and adds strength to the study (Fig. 4). The sample size (n = 58) using a high Pillai's V of 0.09 to calculate the effect size, indicated a very high effect size (see Fig. 4 below). However, though the effect size calculated is adequate, it is expected that a larger sample than this could yield more reliable results.

Data in Table 2 show t test statistics of difference in all stress subscales between the Y-CBT group and WLG at baseline data (Time 1). The mean scores of participants in the Y-CBT and the WLG did not vary significantly in all subscales of stress. There was no significant difference in perception of SS of Y-CBT group (101.49, 11.29) and WLG (100.89, 10.43) (mean difference = 0.60 t = 0.63, P = .59). This shows that participants in both the Y-CBT group and WLG had an equally high baseline rating of SS before the intervention.

Participants' rating of SM subscale also had a non-significant difference between Y-CBT group (74.61, 11.50) and WLG (74.59, 12.37) at baseline (mean difference = .22 t = 0.02, P = .93) at baseline. Generally, participants in Y-CBT (176.10, 39.92) and WLC (175.48, 21.73) groups had non-significant difference in their total TSI rating (mean difference = 0.62; t = −0.01, P = .57). Hence, participants in both Y-CBT and WLG groups not only perceived their jobs as stressful but also experience symptomatic manifestations of stress.

Data in Table 3 show the repeated measures analysis of variance of the effect of the Y-CBT on participant posttest (Time 2), follow-up (Time 3) ratings in the TSI subscales. The results revealed that the main effects of Y-CBT on the 2 main subscales of TSI were significant, at postintervention evaluations (posttest and follow-up).

There was a significant difference in the participants rating of SS of the Y-CBT group (55.08, 27.34) and WLG (100.62, 19.31); F (1, 54) = 83.850, P = .000, η^2 = .48 and Time 3 [Y-CBT group (58.84, 32.62); WLG (104.17, 12.26); F (1, 54) = 76.30, P = .000, η^2 = .46]. These results show that the participants' negative perception of job stressors was reduced using Y-CBT intervention modalities. The total SM score was significantly reduced in the
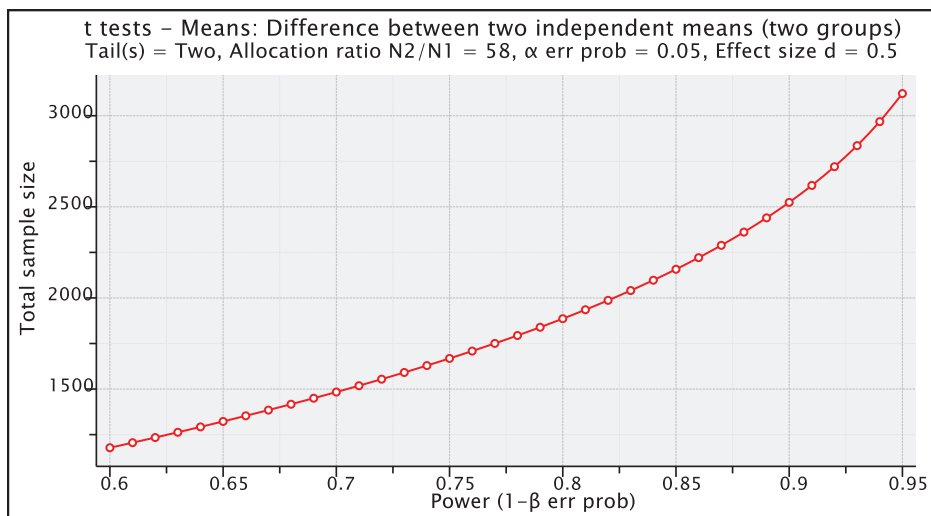
Figure 4. Line graph showing sample size estimation using power analysis. α err prob = Alpha Error Probability, β err prob = Beta Error Probability, d = effect size, N1 = number of participants in group 1, N2 = number of participants in group 2.

Table 2

t test statistics comparing baseline data from Y-CBT and waitlist groups.

Subscale	Group	N	X, SD	Df	t	P	Mean diff.	95% CI Lower	95% CI Upper
SS score	Y-CBT	29	101.49, 11.29	54, 88.85	0.63	.59	0.60	−0.82	6.86
	WLG	27	100.89, 10.43						
SM score	Y-CBT	29	74.61, 11.50	54, 1.611	−0.10	.93	−0.02	−4.41	3.95
	Waitlist control	27	74.59, 12.37						
TSI score	Y-CBT	29	176.10, 39.92	54, 85.713	−0.01	.57	−0.62	−1.79	0.93
	Waitlist control	27	175.48, 21.73						

CI = confidence interval, Df = degree of freedom, M = mean, P = probability value, SD = standard deviation, SM = stress manifestation, SS = stress sources, t = t test statistics, TSI = Teachers' Stress Inventory, WLG = waitlist group, Y-CBT = combined cognitive behavioral therapy and yoga.

Table 3

Repeated measure analysis of variance of the effectiveness of the Y-CBT intervention on posttest and follow-up scores of participants' on TSI subscales.

Subscale	Time	Y-CBT (N=29) M, SD	WLG (N=27) M, SD	DF	F	P	95% CI (upper, lower)	η^2
SS score	Time 2	56.03, 26.34	101.62, 19.31	1, 54	83.850	.000	−55.41, −.35	0.48
	Time 3	57.81, 33.62	103.17, 12.26	1, 54	76.30	.000	−55.64, −35.01	0.46
SM score	Time 2	34.15, 5.24	68.77, 10.63	1, 54	390.627	.000	−38.10, −.31	0.81
	Time 3	33.36, 9.73	71.20, 9.06	1, 54	367.50	.000	−41.75, −33.90	0.80
TSI score	Time 2	89.23, 25.65	169.39, 21.67	1, 54	310.472	.000	−88.11, −.41	0.78
	Time 3	92.21, 29.73	175.39, 9.06	1, 54	305.760	.000	−91.75, −38.90	0.70

CI = confidence interval, Df = degree of freedom, F = analysis of variance test statistic, η^2 = partial Eta square (effect size), P = probability value, SD = standard deviation, SM = stress manifestation, SS = stress sources, TSI = Teachers' Stress Inventory, WLG = waitlist group, X = mean, Y-CBT = combined cognitive behavioral therapy and yoga.

T-CBT group over the WLC group at posttest [Y-CBT group (34.15, 5.24); WLG (68.77, 10.63); F (1, 54) = 390.627, P = .000, η^2 = .81], and at follow-up [Y-CBT group (33.36, 9.73); WLG (71.20, 9.06); F (1, 54) = 367.50, P = .000, η^2 = .80].

Cumulatively, there was a significant difference in the total TSI score of the Y-CBT group and WLC group at posttest [Y-CBT group (89.23, 25.65); WLG (169.39, 21.67); F (1, 54) = 310.472, P = .000, η^2 = .78], and at follow-up [Y-CBT group (91.69, 29.73); WLG (175.39, 9.06); F (1, 54) = 305.760, P = .000, η^2 = .70], with Y-CBT group rating remarkably lower than the WLC group in each of the evaluations. These results show that Y-CBT had a sustained minimizing effect on all dimensions of the global stress of participants (see Table 3). In summary, results in Table 3 indicated a significant decline in stress levels related to perceptive SS, SM, and the total rating of TSI scores.
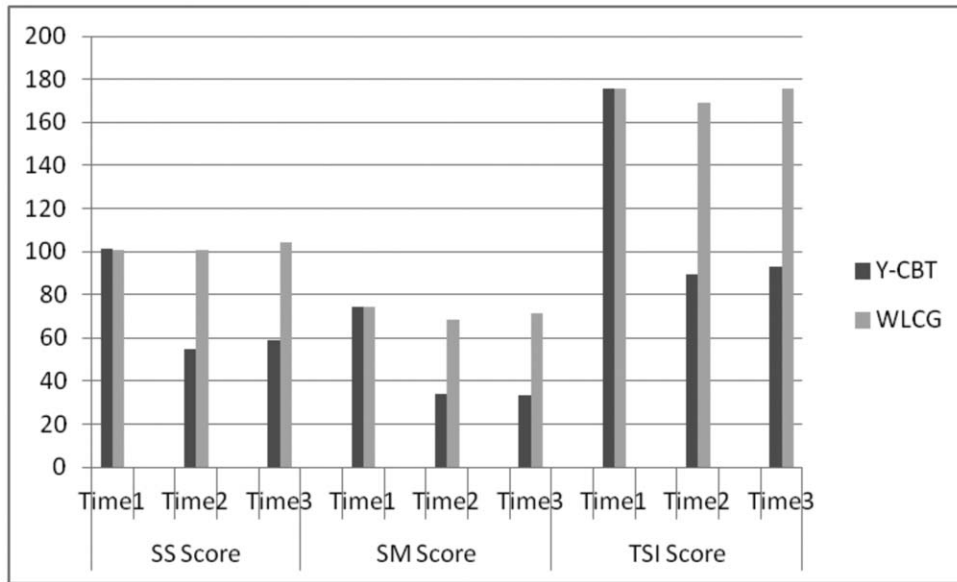
Figure 5 showed that Y-CBT and WLGs had no significant difference in their SS, SM, and global TSI scores at baseline data. At posttest (Time 2) and follow-up (Time 3), there were significant differences in both of the 2 components (SS and SM) as well as the global score (TSI) (Table 4).

Additional analysis was conducted using paired sample *t* test to explore changes in the 3 main subscale scores (SS, SM, and global stress scores) across pre, post, and follow-up in Y-CBT and WLC groups. Paired sample *t* test showed a significant decrease in SS

Table 4

Paired sample *t* test on group times Time effect on participant stress dimensions.

Subscale				Df	T	P	95% CI Low	95% CI High
SS	Y-CBT	Pair 1	Time 1–Time 2	27	11.45	.000	37.69	53.78
		Pair 2	Time 2–Time 3	27	−0.62	.53	6.00	15.85
	WLCG	Pair 1	Time 1–Time 2	26	−0.95	.34	−0.961	3.43
		Pair 2	Time 2–Time 3	26	−7.68	.19	−7.68	0.57
SM	Y-CBT	Pair 1	Time 1–Time 2	27	22.60	.000	32.02	38.28
		Pair 2	Time 2–Time 3	27	−55	.582	−2.05	3.62
	WLCG	Pair 1	Time 1–Time 2	26	0.67	.506	2.54	5.07
		Pair 2	Time 2–Time 3	26	−1.58	.110	−7.20	0.85
TSI	Y-CBT	Pair 1	Time 1–Time 2	27	16.89	.000	71.24	90.13
		Pair 2	Time 2–Time 3	27	−0.444	.65	−16.48	10.52
	WLCG	Pair 1	Time 1–Time 2	26	−0.480	.63	−12.12	−7.46
		Pair 2	Time 2–Time 3	26	−2.09	.55	−12.16	0.20

CI = confidence interval, Df = degree of freedom, P = probability value, SM = stress manifestation, SS = stress sources, TSI = Teachers' Stress Inventory, Y-CBT = combined cognitive behavioral therapy and yoga, WLCG = waitlist control group.

Figure 5. Interaction effect of time and group on the study variables. Figure 3 shows that the Y-CBT and WLG did not vary significantly in their SS, SM, and TSI scores during the baseline evaluation (Time 1). At the posttest (Time 2) and follow-up (Time 3), there were significant differences in SS, SM, and TSI scores between Y-CBT and WLG groups. SM = stress manifestations, SS = stress sources, TSI = Teachers' Stress Inventory, WLG = waitlist group, Y-CBT = combined cognitive behavioral therapy and yoga.

scores of Y-CBT group between Time 1 and 2 (t (27) = 11.45 P = .000, confidence interval [CI] = 37.69, 53.78) and non-significant differences in Time 2 and 3 (t (27) = −0.62, P = .53, CI = 6.00, −15.85) (see Fig. 6). On the other hand, WLC group did not have significant change across Time 1 and 2 (t (26) = −.95, P = .34, CI = −.961, 3.43) and Time 2 and 3 (t (26) = −7.68, P = .19, CI = −7.68, .57) (see Fig. 7). These indicate

that the reduction in Y-CBT group's SS score from pre-test to posttest was sustained through 3 months follow-up.

In respect of SM, there was also a significant reduction in SM scores across Time 1 and 2 (t (27) = 22.60, P = .000, CI = 32.02, 38.28) but non-significant differences in Time 2 and 3 (t (27) = −555, P = .582, CI = −2.05, 3.62) in the Y-CBT group (see Fig. 6). On the contrary, participant in the WLC group did not vary
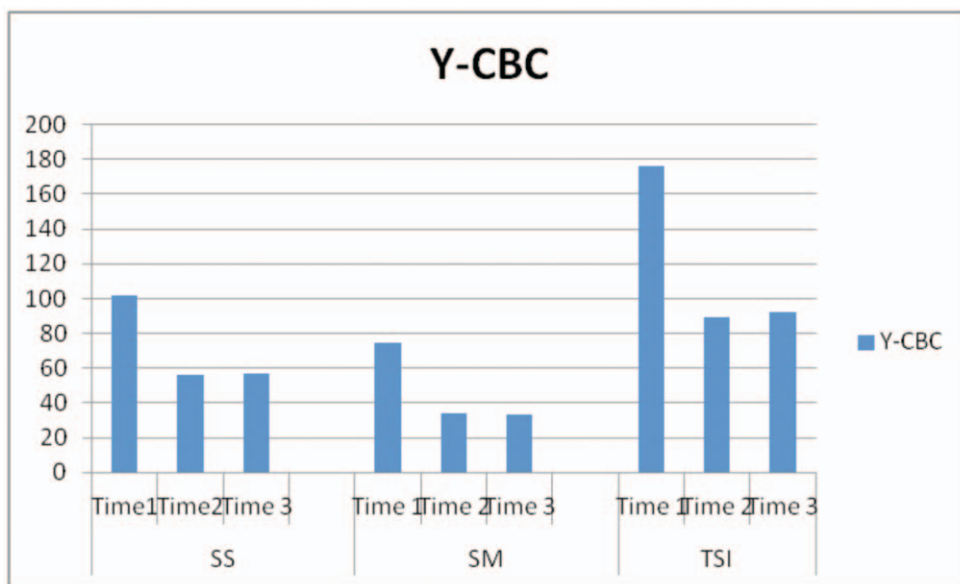
Figure 6. Changes in scores based on Time for Y-CBT group. Figure 4 shows a significant difference in SS, SM, and TSI scores across Times 1 and 2, but not Times 2 and 3. SM = stress manifestations, SS = stress sources, TSI = Teachers' Stress Inventory, Y-CBT = combined cognitive behavioral therapy and yoga.
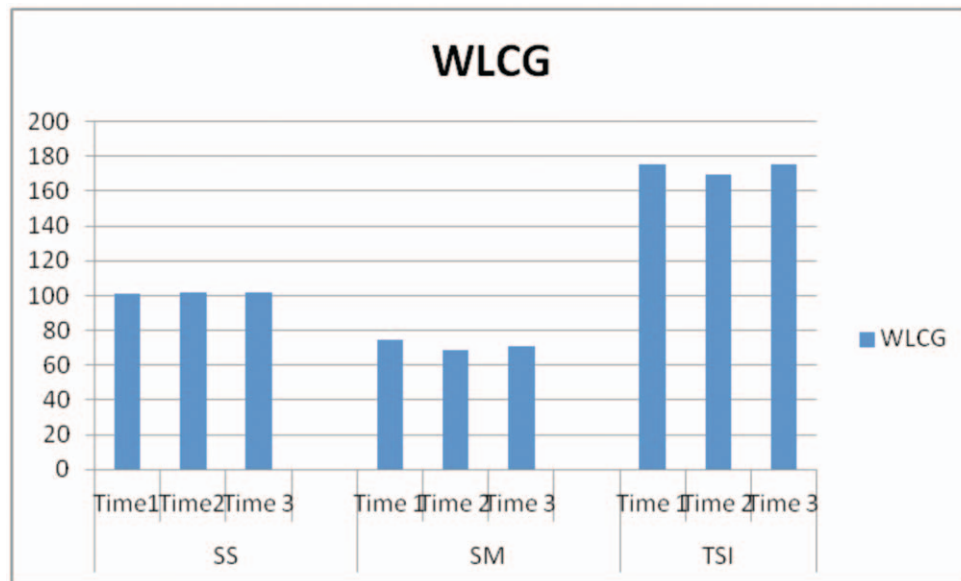
Figure 7. Changes in scores based on time for waitlist group. Figure shows that the mean ratings of the participants on the SS, SM, and TSI did not vary significantly across Times 1, 2, and 3 evaluations. SM = stress manifestations, SS = stress sources, TSI = Teachers' Stress Inventory, WLCG = waitlist control group.

significantly in their SM scores across Time 1 and 2 (t (26) = 0.67, $P = .506$, CI = −2.54, 5.07) and 2 and 3 (t (26) = −1.58, $P = .110$, CI = −7.20, .85). This suggests that the reduced SM at posttest was a product of the interaction effect of the coaching intervention and was sustained across 3 months follow-up (see Fig. 7).

Participants in the Y-CBT group also had significant reduction in overall TSI scores across Time 1 and 2 (t (27) = 16.89, $P = .000$, CI = 71.24, 90.13); but not significant across Time 2 and 3 (t (27) = −0.444, $P = .65$, CI = −16.48, 10.52) (see Fig. 6). On the other hand, participants in the WLC group did not record significant changes in their TSI scores across Time 1 and 2 (t (27) = −0.480, $P = .63$, CI = −12.12, −7.46) and Time 2 and 3 (t (27) = −2.09, $P = .55$, CI = −12.16, .20) (see Fig. 7). The figure further showed that the WLG did not record significant changes in any of the measures across Time 1, 2, and 3 evaluations.

6. Discussion

Job stress in teachers teaching children with ASD negatively affects the teachers, the children, and the education system. This study sought to investigate the effectiveness of Y-CBT in managing the perception of job-stress and stressors among teachers of children with autism. Results showed that Y-CBT and WLG groups did not vary significantly in any of the TSI subscales (SS, SM, and the TSI) scores at baseline evaluation. There was also no significant difference between the 2 groups in all the 5 subscales of SS (time management, work-related stressors professional distress, discipline and motivation, and professional investment) and 5 subscales of SM (emotional manifestation, fatigue, cardiovascular manifestation, gastrointestinal manifestation, and behavioral manifestation). Y-CBT intervention led to a significant reduction in all subscales of (SS and SM) of the TSI, in the Y-CBT group at Time 2 (posttest). The recorded improvements in stress management were sustained through Time 3 (follow-up).

The result further demonstrated significant interaction effects of time and intervention on the measures of participants' stress,

suggesting that the decrease in the stress scores across time was strictly owing to Y-CBT intervention and not due to change in time. Stress scores of the Y-CBT group reported a significant decline in their stress between baseline and posttreatment evaluations, while stress scores of the WLG did not vary significantly across baseline, postintervention, and follow-up evaluations. These suggest that employees can be guided through Y-CBT modalities to change their perspectives about stressful experiences thereby minimizing stress symptoms. Physical exercise can help to harmonize the mind and body to bring about cognitive, emotional, and physiological outcomes.

These results are in line with prior studies that found Y-CBT programs as efficacious in minimizing stress and related psychosomatic disorders. For instance, Allen et al[44] suggested that a 12-weeks manualized Y-CBT protocol reduced pain-related physical and internalizing symptoms. If Y-CBT reduces pain-related physical and internalizing symptoms as noted in the Y-CBT group, then stress reactions could also reduce following Y-CBT intervention. The present study has helped to establish the result of Allen et al. In their pilot study Khalsa et al[35] found that Y-CBT accounted for statistically significant improvements in state and trait anxiety, depression, panic, sleep, and quality of life of participants suffering from anxiety disorders. The indices of stress are similar to those investigated earlier,[35] given that anxiety, depression, panic, sleep disorders, and quality of life are closely linked to stress. The present study has shown that reduction in maladaptive stress perceptions and physical exercise captured in Y-CBT paves way for better adaptation and ultimately reduces symptom associated with stress.

Thus Y-CBT works by disputing the negative and dysfunctional beliefs 'B' in the form of stress perceptions and replacing them with the healthier ones; develop problem-solving skills necessary for contending with SS; and through physical activities, bring together the mind and the body to minimize negative psychosomatic and cognitive symptoms associated with job-demands.[62,63] Y-CBT helps the participants to develop self-

monitoring, time management, and re-evaluation skills for dealing with negative thoughts concerning the trending work-condition for functional efforts. Teachers of children with autism can rely on these skills for stress management and a more functional approach to teaching children with ASD.[64]

The result of the study also supports other studies showing that a positive change in perception of stress can lead to a reduction in physiological and psychological symptoms associated with job-stress.[64] Mohamed,[67] found that Y-CBT opposes negative thoughts, feelings, emotions associated with stressors (occupational environments), replacing them with more helpful ones and deal with existing somatic symptoms that put the employees in a vicious circle of stress reactions.

The effectiveness of Y-CBT could also be partly due to its characteristic strategies of combining yoga postures and regulation of breath repeatedly appeal to the relaxation leading to reduced stress activation and hypothalamic-pituitary axis activity.[35] Hence, such strategies particularly target maladaptive cognitive processes that characterize stress. Additionally, both yoga practices and CBT each have effects in minimizing dysfunctional thought processes. While CBT trains individuals to identify, counter, and replace dysfunctional thoughts with more functional ones, yoga and meditation inhibit the tendency for dysfunctional thoughts by causing the individual to focus on the physical activities.[35] In this way, CBT and yoga may complement each other to reduce anxiety, both by reducing the tendency for negative thoughts to arise (yoga) and by replacing the maladaptive thoughts that do arise (CBT).

Reducing work-place stress reduces psychopathological symptoms such as headache, anxiety, and musculoskeletal problems[67,68] that could undermine teachers' effectiveness. Hence the present study yields itself to a grey area that addresses a present need of Nigerian society. The intervention is considered well-timed, given the heightened stress among teachers of children with ASD who experience high demand for teaching and handling behavioral and psychological problems associated with autism conditions. The study productively confirms the efficacy of Y-CBT in reducing negative perceptions and emotions associated with the job as well as the accompanying physiological symptoms among teachers of children with autism using a randomized control trial.

6.1. Limitations of the study and recommendations for future studies

Our study has some limitations that may threaten its generalizability. Firstly, the present study made use of a relatively small sample. We recommend that further study could apply a larger sample to confirm the effectiveness of the Y-CBT in stress management in teachers of children with autism. Secondly, this study utilized only self-report measures to collect quantitative data, and this may have introduced testing bias to the study outcome. Future studies may use additional qualitative approaches to ascertain participants' satisfaction with the Y-CBT modalities. Studies may be conducted to assess participants' satisfaction with Y-CBT modalities. Another serious limitation of the study is that it did not analyze data on the potential effects, and the associated bias of demographic variables like gender, years of experience, rank, and marital status. Further studies should explore data in the respect of those demographic variables to find out how large the effects of gender, age, and years of experience may be on the teachers. The package (Y-CBT) may also be tried in different

populations of employees with chronic stress conditions. Future studies may be designed to compare Y-CBT and traditional CBT as the current study did not consider the area.

7. Conclusion

The current study investigated the efficacy of Y-CBT in reducing work stress of teachers of children with autism. A 12-week Y-CBT led to a significant reduction in SS, SM, and the global stress inventory scores in the Y-CBT group over those who were waitlisted. We, therefore, conclude that Y-CBT is efficacious in reducing stress among teachers of children with autism. Follow-up study may appraise Y-CBT on other populations of teachers and other employees who experience occupational stress. Further studies could use a larger sample as the result of the present study cannot be generalized due to the small sample.

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