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Article

Rhythmic engagement therapy improved drug use abstinence better than cognitive behavioural therapy among individuals with substance use disorder

Michael Onyeka Ezenwa and Nelson Ifedili Nwankwo

Abstract

Relapse is a major public health concern in the treatment of substance use disorder. Identifying effective and affordable management of relapse is important for reducing significant disruptions in the long-term recovery plan and potential frustrations for patients and their caregivers. The present randomised clinical control study explored the effect of rhythmic engagement therapy (RET), a non-pharmacological intervention, in preventing relapse among polydrug users re-admitted to a public rehabilitation facility. The study also compared the effectiveness of this intervention with cognitive behavioural therapy (CBT). This research was conducted at the National Drug Law Enforcement Agency facility in Onitsha, Nigeria. Thirty participants (10 per group), aged 18 to 60 years ($M = 31.47$; $SD = 9.02$), were sampled for the study. These were randomly assigned into CBT and RET treatment groups, while the third group was the control. Data were collected using the Drug Abuse Screening Test (DAST) and the Short Alcohol Dependence Data Questionnaire (SADD) before and after the intervention that lasted for 3 (three) months. The result from DAST revealed a significant mean difference in the comparative effects of RET and CBT in relapse prevention. Clients who received RET showed a significantly greater reduction in relapse compared to the CBT group with a large effect size (η^2), $F(2, 26) = 33.88$, $p < .001$; Cohen's $d = .723$. Also, the result from SADD showed that there was a significant main effect of RET and CBT interventions on relapse after the pretest was controlled, at $F(2, 26) = 25.13$, $p < .001$ with a moderate effect size (Cohen's $d = .659$). This study recommends incorporating these intervention methods into routine treatment techniques for substance use relapse management and draws attention to further research on RET.

Keywords

Cognitive behavioural therapy, relapse prevention, rhythmic engagement therapy, substance use

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Introduction

Continuous use of substances, despite their negative effects, has been a major pathway to the rising conditions of mental health disorders, crime, suicide, and antisocial behaviour that threaten the socioeconomic development of young people in Nigeria (Oluyemi et al., 2019) and perhaps in other cultures and older populations (Substance Abuse and Mental Health Services Administration, 2020; White et al., 2020). Substance use disorders are associated with abnormal coping strategies that lead to clinically significant impairments in occupational, social, psychological, and overall quality of life (American Psychiatric Association [APA], 2013). The high risk involved in the continuous abuse of drugs has presented considerable concern and prompted a re-evaluation of treatment approaches. While the efficacy of many psychological therapies for relapse management has been established in terms of the degree of symptom reduction (Levy et al., 2021), there is a dearth of literature on the effect of rhythmic engagement therapy on symptom remission (Ezenwa & Nwankwo, 2021). Relapse prevention in the context of this work is defined as the maintenance of abstinence after treatment among people with substance use disorder.

Rhythmic engagement therapy (RET), also referred to as the first Tibetan rite, spinning therapy or simply rhythmic engagement, is the first of the five Tibetan rites (Kelder, 1985) characterised by spinning from left to right while erect, with both arms stretched horizontally to the floor, which enhances balance until one feels tolerably dizzy. Although the mechanism of action of this method in relapse treatment is not yet clearly understood, there is the belief that the ensuing dizziness is consequent upon oscillation of the cerebrospinal fluid that induces increased electrical activities in the brain strong enough to distract craving. It is also believed that this electrical stimulation has a harmonising effect on hormone redistribution, similar to the effect of electroconvulsive therapy on patients with severe depression. This rhythmic engagement therapy is a non-invasive, non-pharmacological, easily implementable, and effective method of relapse treatment (Ezenwa & Nwankwo, 2021).

The goal of the current study is therefore to explore further evidence on the effect of rhythmic engagement therapy on relapse management and to compare its effectiveness with cognitive behavioural therapy (CBT). Clinically significant positive change in drug use behaviour is one of the most viable ways to explain recovery. However, there is no universally accepted approach that is most effective in addressing the problem of relapse (Reville & Kadia, 2021), hence, the need to explore a new paradigm.

Most existing methods of relapse treatment involve the use of pharmacological agents in detoxification, drug substitution therapy or other purposes to assist the patient in tolerating the impact of cravings and accompanying withdrawal symptoms. In addition to the cost of these drugs and their side effects, there are situations, especially in comorbidity (involving the kidney, liver, heart, or spleen), where medications may be contraindicated, creating difficulties in making clinical judgement and thus the need for a new intervention to relapse management.

Indeed, managing relapse could present significant challenges to the reintegration of individuals with substance use disorders (Kabisa et al., 2021). More recently, harm reduction therapy such as substitution therapy (use of methadone, for instance) has been introduced to facilitate recovery, yet the challenges persist. This is perhaps why many repeated relapse cases have been subjected to maintenance therapy (Reville & Kadia, 2021), which invariably fails to satisfactorily facilitate change in recovery. Thus, recent interventions have focussed on equipping and training people with substance use disorders in long-term psychological skills that help them maintain drug use abstinence long after discharge. For example, CBT and acceptance and commitment therapy have recorded significant success in the treatment of relapse (Hashemi et al., 2022; Levy et al., 2021).

However, despite the successes recorded by these interventions, the problem of relapse continues to surge (Okonkwo et al., 2020; Razali & Madon, 2020).

A number of randomised controlled trials have established that more than 75% of patients who received treatment for substance abuse relapsed within 6 months of withdrawing from the treatment (Kabisa et al., 2021). Hasin et al. (2013) and Kabisa et al. (2021) estimated 40–75% within 3 weeks to 6 months, while the National Institute on Drug Abuse [NIDA] (2018) estimated 85 five percentage. Other studies showed conflicting results on the notion that relapse occurrence is estimated between 1 month and 1 year after discharge from treatment (Guenzel & McChargue, 2021).

However, it is important to note that different factors could predict relapse in different patients. Relapse was significantly higher in low- and middle-income countries (LMIC) (United Nations Office on Drugs and Crime [UNODC], 2021). In a systematic review involving LMIC, Kabisa et al. (2021) observed that there was a higher tendency of relapse among substance-dependent individuals who lived with single parents (mothers) than those who lived with both biological parents. Also, patients who were hospitalised for more than 3 months in treatment had better treatment outcomes than those who stayed for a shorter period. Furthermore, they observed that polydrug users had a greater risk of relapse than single-drug users (Kabisa et al., 2021).

Frequent relapses could diminish the continued efforts to assist and support patients by family and significant others. It may result in suicidal ideation, organised crime, vengeance missions, terrorism, and massive spending on mental health care, which could have a negative impact on individuals, families, and society (UNODC, 2017). Relapse is believed to represent an epoch in substance use recovery, and the challenges it poses remain a serious threat to physical and mental health care in most societies, especially in low- and middle-income countries.

In terms of prevalence, recent documentation on addiction by the World Drug Report in 2021 showed that over 35 million people worldwide relapsed into drug use after receiving some treatment. This translates to high costs for the individual and the public sector, especially where there is functional health insurance. There is therefore the need to find more effective methods of treatment that sustain abstinence over time than the existing ones. This is because the individual and societal costs of unrelenting relapse, including prolonged suffering and despair, could be distressing and worrisome (Okonkwo et al., 2020).

In addition to the foregoing, a lack of knowledge of treatment facilities could be a compounding variable among drug users. Ezenwa et al. (2020), in a study on trafficking opiate routes in Nigeria: identifying trafficking routes via dealers and users of tramadol and codeine, reported that 47.4% of tramadol users and 30% of codeine-containing mixture users indicated an interest in treatment. Unfortunately, 50% of codeine-containing mixture abusers and 47.5% of tramadol users did not know where to access treatment.

Rhythmic engagement therapy

In our earlier research, we explained that systematic rhythmic engagement therapy can induce high metabolic and tolerable rates of dizziness, increased cardiac activities, other hormonal redistribution and visceral actions that will dominate craving sensations and, as such, may help reduce relapse in the patients (Ezenwa & Nwankwo, 2021). This could be explained on the basis of a higher behaviour activation stimulus (rhythmic engagement therapy) displacing another of comparatively lower intensity (craving). Furthermore, we posit in line with the neurophysiological model of addiction (Adinoff, 2004; Lüscher, 2016) that addiction develops as a consequence of drug-induced overexcitatory activities essentially at the mesolimbic, dopaminergic, and other ancillary limbic system areas that functionally connect with the reward system epitomised by the nucleus accumbens. It is therefore possible that any intervention that attempts to regulate or

moderate this over-excitation of the aforementioned systems could help to mediate the rate these systems fire and consequently initiate control over craving and, by implication, dependence/addiction. Indeed, the Hebbian theory of plasticity posits that neurons that work together fire together (Hebb, 1949). This is the crux of our model, rhythmic engagement therapy.

For instance, amphetamine use can stimulate the release of dopamine and norepinephrine while blocking their reuptake, and rhythmic engagement therapy has been explained to be a complex inhibitor for craving experiences, withdrawal symptoms, and relapse (Ezenwa and Nwankwo, 2021). It is believed that addiction and relapse share common boundaries as a result of cravings consequent upon over-activation of the reward pathways. This may explain why substance users, after receiving treatment, still reported significant obsessive cravings (Xia et al., 2022). With addiction, the brain reward system becomes drug-dependent and less sensitive to natural stimulants (Wise, 1998). Unfortunately, the theoretical assumption of brain functioning in addiction recovery has received little attention, even though long-term abstinence may allow the brain to resume normal functioning, paving the way for long-term success (Volkow et al., 2011). Also, there seems to be insufficient attention by researchers on other newer non-pharmacological, non-invasive, affordable, well-tolerated, and effective ways of managing craving, as similar body-based studies (Kuppili et al., 2018; Liu et al., 2020; Lutz et al., 2019) neither focussed on craving management nor compared CBT and RET. This constitutes the focus of the present study.

On the other hand, CBT is a method of psychotherapy developed by Aaron Beck in the late 1960s to address the negative cognition that precipitates psychological problems. Its therapeutic method involves changing irrational patterns of thinking and undergoing progressive cognitive restructuring. It is also known as one of the best approaches to addiction treatment and other related mental disorders (Alavi et al., 2023; Guenzel & McChargue, 2021). CBT has received some strong and significant empirical support in the treatment of a wide range of psychological conditions, most notably in the treatment of alcohol and substance use disorders, with effect sizes ranging from moderate to large (Carroll & Kiluk, 2017; Magill et al., 2023). The therapeutic approach is often employed to treat a client's irrational thought patterns, feelings, and physical sensations that trigger substance use and relapse, as well as train the client on how to control internal distress and discomfort.

This assertion is supported by Marlatt and Gordon's (1985) cognitive behavioural model of relapse prevention, which assumes that high-risk situations trigger the process of potential relapse. This therapy assists individuals in overcoming the obstacles to a drug-free life and equips them with the skills necessary for recovery (Bador & Kerekes, 2020). Depending on an individual's needs, different skills may be emphasised in CBT. Despite its effectiveness, relapse rates among substance use disorder patients continue to be high (Wang et al., 2021).

It is obvious that pharmacotherapy and psychotherapy have not eliminated relapse as a major clinical challenge in the management of substance use disorders. Pharmacological agents may be important in some phases of treatment, but they often have some setbacks. Non-drug-based interventions are easily applicable, inexpensive, non-invasive, and non-harmful in terms of chemical side effects. Indeed, there is perhaps nil to unsatisfactory evidence that drugs can independently have a significant and sustained effect on substance use disorders and relapse prevention, even in the case of substitution therapy such as the use of methadone, among others. Guenzel and McChargue (2023) noted that there is inadequate empirical support for the effect of nicotine replacement and varenicline therapy on the prevention of relapse. In addition, varenicline treatment is predicated on its ability to block the $\alpha\beta42$ receptor to stimulate the central nervous system via the mesolimbic system. However, varenicline therapy is associated with known side effects, including nausea, abnormal dreams, nasopharyngitis, insomnia, and headaches.

The present study

RET is new and, being a body-based therapy, may offer additional systemic benefits unlike CBT, which is only cognitive/psychological. There is therefore the need to examine the effect of rhythmic engagement therapy in relapse management among polysubstance-dependent individuals, given its potential to represent a new, effective, affordable, simple, and non-pharmacological method of relapse management.

Based on the foregoing, we hypothesised that:

(a) Rhythmic engagement will significantly and independently reduce relapse among polysubstance users.
(b) Cognitive behavioural therapy will significantly and independently reduce relapse among polysubstance users.
(c) Polydrug users who received rhythmic engagement will report a significantly higher reduction rate in relapse when compared with those who received cognitive behavioural therapy.

Methods

Participants

The participants in the study were selected using simple randomisation (the fishbowl method). These were 30 persons with a history of polysubstance use disorder. They were chosen from the inpatient population of clients in the drug demand reduction unit of the National Drug Law Enforcement Agency (NDLEA) in Onitsha, Anambra State Command, Nigeria. The participants' ages ranged from 18 to 60 ($M = 31.47$; $SD = 9.02$) and included 28 representing 93.3% males and 2 representing 6.7% females, all with a history of relapse.

Eligibility and informed consent: The eligibility for participation is demonstrated in the following inclusion criteria. (1) Those fully admitted into the NDLEA facility for rehabilitation for more than 2-week duration. (2) The individual must show signs of craving to use the substance of abuse. (3) Those who continued to use (before admission) despite obvious negative consequences. (4) Those who experienced withdrawal symptoms following restrictions on access to the substance of abuse. (5) Those who willingly agreed to participate in the study (volunteers). (6) Those with no obvious medical conditions that would preclude them from participating. (7) Those with a history of relapse. An informed consent letter was signed by the participants who met the inclusion criteria for the study. To maintain confidentiality, no participant's details were captured in the report. In addition, data management was strictly done by the researchers, thus preventing any form of leakage of information. The computer system used for data gathering and analysis was passworded to ensure no unauthorised access to the data.

Instruments

Drug Abuse Screening Test (DAST): This scale was designed to evaluate people who use drugs other than alcohol (Gavin et al., 1989). The 28-item scale included some characteristics of dependence syndrome, such as the inability to abstain, withdrawal symptoms, and a variety of social and emotional problems associated with drug abuse. For each of the items, the scale is rated in a dichotomous response format, with 1 = yes and 2 = no. However, for items 4, 5, and 7, the authors recommended a score of '1' for each of the three items on a 'NO' response. The final score is calculated by summing the number of items that indicate drug use issues. The scale demonstrated

good psychometric properties in a clinical population, with a reliability coefficient of .92 (Gavin et al., 1989). The Cronbach alpha for the present study was .86, which further confirmed the reliability of the instrument.

Short Alcohol Dependence Data Questionnaire (SADD): This is a 15-item self-report questionnaire designed to assess the degree of alcohol dependence based on a continuum of mild problem drinking to severe alcohol dependence (Raistrick et al., 1983). The scale is rated on a 4-point Likert-type response format ranging from 0 = Never, 1 = Sometimes, 2 = Often, and 3 = Nearly always. The total score is calculated by adding all of the responses and is expected to range from 0 to 45. However, the degrees of alcohol dependence scores are represented as follows: 1–9 (mild dependence), 10–19 (moderate dependence), and 20–45 (severe dependence). The Cronbach alpha for the current study was .79.

Procedure

The researchers obtained permission from all relevant authorities and employed the services of the Assistant Commander of Narcotics in the Drug Demand Reduction Unit of the facility to help in recruiting the participants. It was ensured that participation in the study was entirely voluntary. Rapport and assurance of confidentiality were established. Fifty participants agreed to participate in the study; however, 10 participants did not meet the inclusion criteria due to age and other medical conditions. Five participants declined after the 'objectives' of the study were explained to them. Also, 5 participants withdrew during the early stage of the study due to their discharge. This was before baseline data were collected. Thus, 30 participants took part in the study. The participants were randomly assigned into three groups of 10 participants each through the use of simple randomisation. Thirty pieces of paper that contained the names of the groups (group A, group B, and group C) were used. The papers were folded and shuffled inside a bag, and the participants were asked to pick from there. They were placed in the respective groups that they picked. Group A represented the rhythmic engagement therapy, Group B represented the CBT, and Group C represented the control. The control group was given unrelated stories to engage their attention each time the other two groups had sessions.

Before the intervention, baseline measurements were taken using the study protocol and urine samples from the participants. The goal of the one-time urine sample test was to confirm evidence of drug use and the drugs of abuse by the participants. After the intervention, the participants were reassessed to determine the effectiveness of the treatment conditions. The therapy sessions were twice a week (Tuesdays and Thursdays), and lasted 2 hours per session. In general, the entire treatment lasted for 3 months.

Rhythmic Engagement Therapy Sessions: The therapist first introduced the RET by demonstrating its process to the participants. Thus, they were taught how to spin, starting from the left side to the right side while stretching the hands sideways horizontally to maintain balance. This process was conducted in the morning before meals and continued throughout the intervention period. They were encouraged to practise it, and thereafter, they performed the exercise with close supervision. In addition, each participant could repeat the same activity at other convenient times within the day. They were encouraged to spin between 10 and 15 times in a row after the individual had mastered the practice, with some spinning 5 to 10 times at the beginning, though this frequency increased for some people in subsequent trials. Each number of correct trials was given a score of 1, and failed trials received a zero score. These scores of 1 and zero were used for performance evaluation and motivation for the participants to remain on the exercise and were not used for data analysis.

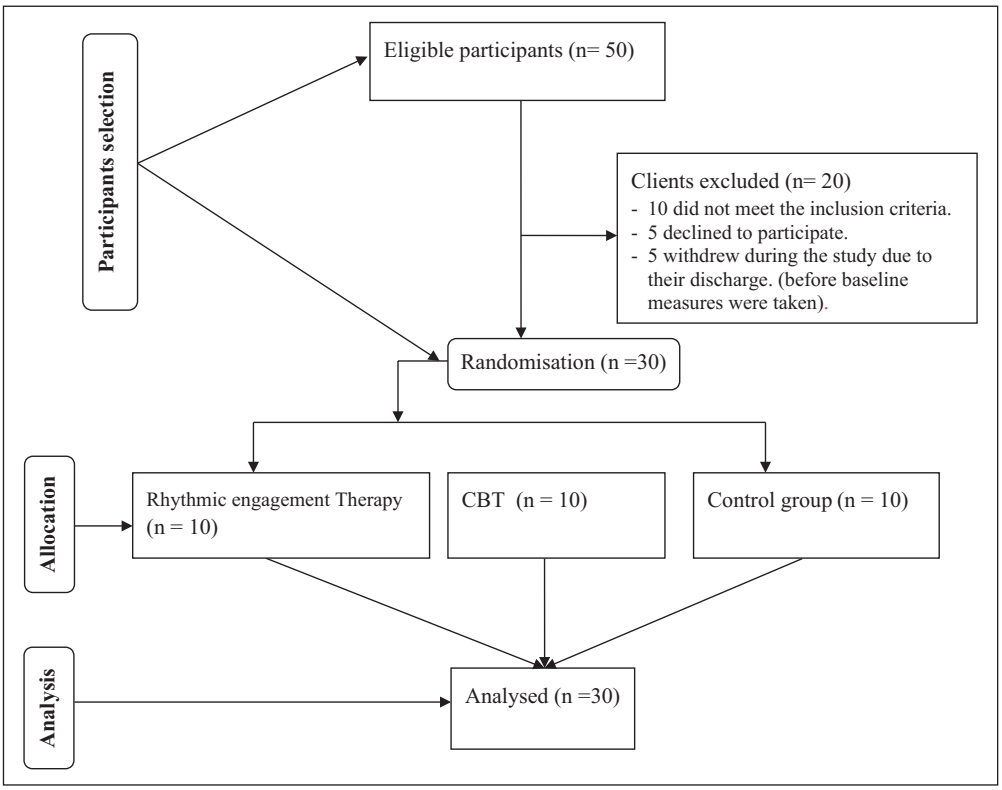

Figure 1. The CONSORT flow diagram of the treatment stages.

Cognitive-behavioural therapy sessions: This session highlighted a functional analysis of cues for drug use and the systematic training of alternative responses to these cues. It involved offering flexible, low-cost, standardised means of intervention that targeted cognitive, affective, and environmental risks for substance use as well as providing training in coping skills to help the client achieve and maintain abstinence. The application of this therapy focussed on Marlatt and Gordon's (1985) model of relapse prevention, which emphasised the identification and prevention of high-risk situations like going to the beer parlour or bars, keeping friends that use drugs, and going to environments that trigger early substance use. All these triggers may predispose the client to engage in drug use even after discharge. Using the model, the techniques employed in relapse prevention involved challenging the client's expectation of perceived positive effects of use and providing psychoeducation to help them make a more informed choice in the threatening situation.

Figure 1 below depicts how the Consolidated Standard Trials (CONSORT) progressed through the various stages of a randomised trial of the study's selected groups.

Ethical consideration

The study was approved by the Nnamdi Azikiwe University Institutional Review Board with approval reference number HASSREC/NAU/23/21. The access to the study facility was approved by NDLEA. To the best of our knowledge, the study adhered to the ethical standards outlined in the Revised Helsinki Declaration.

Data analysis

Descriptive statistics was employed to classify the participants' sociodemographic variables. A one-way analysis of covariance (ANCOVA) F-test was deployed for data analysis and hypotheses testing. The pretest was entered as a covariate, the posttest as the dependent variable, and treatment conditions (independent variables) as the fixed factors. We further examined the magnitude of the effect of the treatment conditions using Cohen's *d* (effect size). Finally, to correct for any error occurrence at the significant level, we conducted a post hoc analysis using the Bonferroni correction. All the data were analysed using Statistical Package for the Social Sciences (SPSS) version 25. In addition, the participants were randomly selected to control for extraneous variables such as experience, intelligence, age and gender. A pre-test-post-test control group design was employed in the study.

Results

Participants' characteristics (see Appendix 1)

Analysis of covariance F-test. The results in Table 1 below showed a significant main effect of the treatment conditions (RET and CBT) on relapse after controlling for the pretest measures at $F(2, 26) = 33.88$, $p < .001$ level of significance. The corresponding effect size (η^2) of treatment efficacy was large (Cohen's $d = .723$), and this explained 72.3% of the variation in relapse prevention of substance use disorders among the participants. Thus, the first and second hypotheses were accepted. Hence, RET and CBT were effective relapse prevention techniques.

Post hoc comparisons (DAST). Post hoc comparison using the Bonferroni test for group differences. Table 2 showed the mean score of the RET group ($M = 5.69$, $SE = 1.78$, $p < .05$) was significantly different from the control group ($M = 14.39$, $SE = 1.78$, $p < .05$) in relapse prevention.

Also, there was a significant difference between participants in the CBT group ($M = -5.688$, $SE = 1.776$, $p < .05$) and the control group ($M = 8.70$, $SE = 1.69$, $p < .001$) in their mean scores. This further confirmed the acceptance of the second hypothesis of the study. Furthermore, there was a significant difference between the RET group ($M = -14.39$, $SE = 1.776$, $p < .001$) and the CBT group ($M = -8.70$, $SE = 1.69$, $p < .001$) in the mean scores; hence, hypothesis three of the study was accepted. This means that participants in the RET group showed more improvement than the CBT group on relapse.

Table 1. Summary table of tests of between-subjects effects and effect sizes (Cohen's *d*) using DAST.

Source	Type III sum of squares	Df	Mean square	*F*	Sig.	Partial Eta squared
Corrected Model	1196.266[a]	3	398.755	27.818	.000	.762
Intercept	2173.380	1	2173.380	151.617	.000	.854
Pretest	32.999	1	32.999	2.302	.141	.081
Groups	971.215	2	485.608	33.876	.000	.723
Error	372.701	26	14.335			
Total	13529.000	30				
Corrected Total	1568.967	29				

[a]*R* Squared = .762 (Adjusted *R* Squared = .735).

Table 2. Summary table of pair-wise comparisons (post hoc) for DAST.

(I) Groups	(J) Groups	Mean difference (I-J)	Std. error	Sig.[a]	95% confidence interval for difference[a]	
					Lower bound	Upper bound
RET	CBT	5.688*	1.776	.011	1.144	10.232
	control group	14.388*	1.776	.000	9.844	18.932
CBT	RET	−5.688*	1.776	.011	−10.232	−1.144
	control group	8.700*	1.693	.000	4.367	13.033
control group	RET	−14.388*	1.776	.000	−18.932	−9.844
	CBT	−8.700*	1.693	.000	−13.033	−4.367

CI = Confidence Interval; RET: Rhythmic engagement therapy.
[a]Adjustment for multiple comparisons: Bonferroni.
* = $p < .05$ level of significance; ** = $p < .001$ level of significance

Table 3. Summary table of tests of between-subjects effects using SADD scores.

Source	Type III sum of squares	df	Mean square	*F*	Sig.	Partial Eta squared
Corrected Model	852.922[a]	3	284.307	18.646	.000	.683
Intercept	1893.748	1	1893.748	124.198	.000	.827
Pretest	12.856	1	12.856	.843	.367	.031
Groups	766.440	2	383.220	25.133	.000	.659
Error	396.444	26	15.248			
Total	12579.000	30				
Corrected Total	1249.367	29				

[a]*R* Squared = .683 (Adjusted *R* Squared = .646).

The results in Table 3 revealed a significant main effect of RET and CBT interventions on relapse after the pretest was controlled, at $F(2, 26) = 25.13$, $p < .001$ level of significance. The corresponding effect size (η^2) of treatment efficacy was moderate (Cohen's $d = .659$), and this explained 65.9% of the variation in relapse prevention among the participants.

Post hoc comparisons (SADD). The Bonferroni test showed the RET group ($M = .99$, $SE = 1.83$) was significantly different from the control group ($M = 11.39$, $SE = 1.83$, $p < .001$) in their mean scores. Similarly, there was a significant mean difference between CBT ($M = -.99$; $SE = 1.83$) and the control group ($M = 10.40$; $SE = 1.75$, $p < .001$). Furthermore, there was a significant mean difference between the RET group ($M = -11.39$, $p < .001$) and the CBT group ($M = -10.40$, $p < .001$).

Discussion

This study examined the effect of RET and CBT on relapse prevention in the treatment of substance use disorder among clients undergoing rehabilitation. The results found that both treatment paradigms were significantly effective in relapse prevention among substance abusers. RET was, however, more effective than CBT.

Based on this observation, RET effectively served as a coping skill for patients with a history of substance use disorder. Although we do not have enough explanation for this observation,

Table 4. Summary table of pair-wise comparisons (post hoc) for SADD.

(I) Groups	(J) Groups	Mean difference (I-J)	Std. error	Sig.[b]	95% confidence interval for difference[b]	
					Lower Bound	Upper Bound
RET	CBT	.993	1.831	1.000	−3.693	5.680
	control group	11.393[a]	1.831	.000	6.707	16.080
CBT	RET	−.993	1.831	1.000	−5.680	3.693
	control group	10.400[a]	1.746	.000	5.931	14.869
Control group	RET	−11.393[a]	1.831	.000	−16.080	−6.707
	CBT	−10.400[a]	1.746	.000	−14.869	−5.931

Based on estimated marginal means.
[a]The mean difference is significant at the .05 level.
[b]Adjustment for multiple comparisons: Bonferroni.

we suspect that the cerebrospinal fluid oscillation induced by RET may have produced hormone harmonisation that reduced the overexcitement of the reward system that characterises substance dependence. In other words, our observation is that the participants who took part in the RET were sustained without medication or obvious intolerable craving spells. We believe that the RET induces hormonal redistribution in the relevant reward neural pathways that tend to balance the impact of drug use on the reward system, mediate the degree of excitation, and consequently inhibit the neurophysiological basis of craving.

We also suspect that the dizziness induced by the RET may have dominated the craving behaviour due to its high psycho-physiological arousal index. It might be possible that the capacity of the RET to inhibit craving may have been self-reinforcing to the participants who found the therapy exciting and beneficial. Evidence from previous research (Ezenwa and Nwanko, 2021; Graham-Brown et al., 2021; Luan et al., 2022) demonstrated that RET would invariably cause a high metabolic rate that could lead to physical deconditioning of the body and ventral tegmental area in the brain, as well as increased metabolic and intracranial activities that may dominate the present attention of the participants, including craving behaviour, thus reducing the possibility of relapse. A significant amount of routine exercise, according to research (Graham-Brown et al., 2021), may improve one's quality of life and health as well as positively affect lifestyle. This applies to RET, which we believe stimulates the mobilisation of visceral actions in the body and may be highly effective in patients with substance abuse-related relapse cases as well as knee osteoarthritis (Ezenwa and Nwanko, 2021; Luan et al., 2022). According to More et al. (2017), systematic exercise has significant mental health-related implications for the rehabilitation of chronic substance use disorders. Much could be accomplished in terms of mental health, treatment, and recovery with the ongoing involvement of RET, which may facilitate a positive, healthy lifestyle and well-being.

This result is in harmony with Patterson et al.'s (2022) findings from a systematic review that controlled exercise has a promising outcome in the treatment of addiction. Several authors have documented that regular exercise reduces cravings by potentially and significantly inducing a therapeutic change in relapse in both clinical and non-clinical populations (Luan et al., 2022; Patterson et al., 2022). Individuals recovering from substance use and related processes may benefit more from exercise, in addition to other health benefits that it may provide. Similarly, the findings of this study are further supported by Castillo-Viera et al.'s (2022) assertion that integrating coadjutant interventions such as vigorous exercise in treatment and rehabilitation for substance abuse alongside other medical or psychological treatments is quite effective in improving health factors including quality of life, sleep patterns, and emotions, as well as lowering the risk of social isolation.

On the other hand, the findings of this study are in support of existing literature on the effectiveness of CBT in relapse prevention. Gharaibeh et al. (2022) demonstrated that CBT modified addictive behaviours by reducing the risk of relapse and contributing to making such changes permanent. In the same manner, Karsinti et al. (2022) highlighted that CBT targeted at a group of stimulant use disorder patients was remarkably effective in relapse prevention across different age groups. Aside from decreasing use, craving, and abstinence, CBT also increases cognitive flexibility and self-efficacy by decreasing negative affect and other psychological conditions (Zamboni et al., 2022).

The findings of this study have some practical and theoretical implications for the treatment of relapse when comparing approaches. It introduced a new frontier in relapse prevention using CBT in conjunction with RET. We suspect that the result will have a cost-relief impact on patients, caregivers, and public health expenditure, given that the intervention is completely non-pharmacological and inexpensive. To the best of our knowledge, the participants were not on medication for the period of the study, and we feel this is a major contribution to existing relapse management methods. This may spark a rethink in science as to which treatment is more effective and less expensive in substance use intervention, especially taking into consideration the non-pharmacological nature of RET.

Though literature has supported that both RET and CBT can re-modulate the prefrontal cortex (e.g., the area of the brain responsible for planning complex cognitive behaviour, personality expression, decision-making, and moderating social behaviour) in addiction disorders (Ezenwa and Nwankwo, 2021; Zamboni et al., 2022), the two treatments significantly differed in their effects. For example, RET provides a large effect size in its approach when compared with the low effect of CBT in the study.

Although the result of this study is promising, certain drawbacks may be noted. The client population in this study was institutionalised and may have secretly taken some sort of medication despite their voluntary commitment to the contrary. However, we made certain that the participants had a history of relapse within the previous 6 months to 1 year and, to the best of our knowledge, were not on medication during the study. Nevertheless, caution is needed in generalising these results.

Note that several people who had inpatient addiction treatment relapsed even in treatment or after discharge. In our case, the participants were compliant throughout the treatment duration, and we have no basis to suspect a reversal of the situation after discharge. Although the post-treatment measurement was taken while the participants were still institutionalised, we believe that they may remain compliant given their increasing motivation in the RET during the intervention.

The study period was less than a year, and we believe that a longer period of working with the participants to monitor their drug-free status would have given more confidence in the long-duration effectiveness of the intervention. It is hoped that researchers may be interested in doing this in the future. Addiction studies experience high rates of attrition and recruitment difficulties (Paterson et al., 2015), and this often leads to the use of small samples. In the present study, though we used a randomised control trial, the relatively small sample calls for caution until large-scale studies are done with hopefully similar outcomes. While the participants were informed at recruitment that the process may improve their mental health, none knew the exact focus of the study. The authors believe that the information did not affect the performance of the research protocol.

We hope that funders will invest in this new intervention method to authenticate our findings or otherwise, given their great implications for a drastic reduction in treatment costs, duration, and suffering for the patients, families, and the entire public health system.

Conclusion and recommendations

This study investigated the comparative effects of RET and CBT in relapse prevention. Our findings, we believe, have provided critical and timely insights into the efficacy of both therapeutic

measures in the treatment of relapse among clients in a Nigerian institutionalised home. The adoption of both therapies may benefit relapsed clients as well as inform future researchers aiming to develop a sustainable approach to relapse management in substance use disorders. We, therefore, call for more large-scale studies to provide additional data on the effectiveness of RET in the management of relapse, as this portends a major paradigm shift in the entire addiction science treatment practice. This is more so given the *via regia* (golden road) the study has provided for economically excluded patient populations, especially in low and middle-income countries, and for patients whose conditions may not tolerate pharmacological intervention, especially in situations of complex comorbidities.

Contributions of authors

Michael Onyeka Ezenwa developed the intervention and supervised the article that was written by both authors.

Nelson Ifedili Nwankwo provided sources for the literature and conducted data analysis.

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Availability of data and materials

The raw data will be made available by the corresponding author upon practical request.

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Appendix 1

Participants characteristics

The sociodemographic details revealed that in RET group, 9 (90%) of the participants were males whereas 1 (10%) was female. Tribe details showed that 1 (10%) of the participants was Yoruba, 1 (10%) Hausa, and 8 (80%) Igbo. Marital status showed 8 (80%) were single while 2 (20%) were married. Educational qualifications showed 2 (20%) had primary education, 3 (30%) had Senior Secondary education (SSCE), 3 (30%) had Ordinary National Diploma (OND) or Higher National Diploma (HND), and 2 (20%) had a bachelor's degree. The religious affiliation showed 10 (100%) were Christians. Family type indicates 4 (40%) were from monogamous families, 3 (30%) polygamous families, 1 (10%) were from divorced home, and 2 (20%) were from single-parent families. Length of time in treatment (**duration of illness before our intervention**) showed 3 (30%) stayed 2 weeks to 1 month, 3 (30%) stayed 1 month to 3 months, 3 (30%) stayed 3 months to 6 months, and 1 (10%) had stayed 6 months to 1 year. Types of drugs used showed 5 (50%) used alcohol, 2 (20%) used cannabis sativa, 1 (10%) used codeine, 1 (10%) used cocaine, and 1 (10%) used methamphetamine. Occupational status showed 4 (40%) were either employed or self-employed, whereas 6 (60%) were unemployed.

In the CBT group, 9 (90%) were males whereas 1 (10%) was female. Two (20%) were Yoruba and 8 (80%) were Igbo. Six (60%) of the participants were single, 3 (30%) were married and 1 (10%) was divorced. Three (30%) had senior secondary education, 3 (30%) OND or HND, and 4 (40%) had a bachelor's degree. Nine (90%) were Christians, whereas 1 (10%) was Muslim. Eight (80%) were from monogamous families while 2 (20%) were from polygamous families. One (10%) had stayed in the rehabilitation home for 2 weeks to 1 month, 4 (40%) stayed 1 month to 3 months, 2 (20%) stayed 3 months to 6 months, 2 (20%) stayed 6 months to 1 year, and 1 (10%) stayed 1 year to 2 years. Five (50%) used alcohol, 4 (40%) used cannabis sativa, whereas 1 (10%) used methamphetamine. Five (50%) were either employed or self-employed, whereas 5 (50%) were unemployed.

In the control group, 10 (100%) were males. One (10%) was Yoruba, and 9 (90%) were Igbo. Seven (70%) were single while 3 (30%) were married. One (10%) had primary education, 4 (40%) had secondary education, 3 (30%) had OND or HND, and 2 (20%) had a bachelor's degree. Nine (90%) were Christians while 1 (10%) was Muslim. Six (60%) were from monogamous families, 2 (20%) were from polygamous families, and 2 (20%) were from divorced homes. Four (40%) had stayed 2 weeks to 1 month, 2 (20%) had stayed 1 month to 3 months, 3 (30%) had stayed 3 months to 6 months, and 1 (10%) had stayed 6 months to 1 year. Two (20%) used alcohol, 5 (50%) used cannabis sativa, and 3 (30%) used methamphetamine. Three (30%) were either employed or self-employed, whereas 7 (70%) were unemployed (Table 1A).

Table 1A. Participants' sociodemographic information ($N = 30$).

Variables	RET	CBT	Control group
	F (%)	*F* (%)	*F* (%)
Gender			
Male	9 (90)	9 (90)	10 (100)
Female	1 (10)	1 (10)	-
Ethnicity			
Yoruba	1 (10)	2 (20)	1 (10)
Hausa	1 (10)	-	-
Igbo	8 (80)	8 (80)	9 (90)
Marital Status			
Single	8 (80)	6 (60)	7 (70)
Married	2 (20)	3 (30)	3 (30)
Divorced	-	1 (10)	-
Educational Qualification			
Primary school	2 (20)	-	1 (10)
SSCE	3 (30)	3 (30)	4 (40)
OND/HND	3 (30)	3 (30)	3 (30)
BSC	2 (20)	4 (40)	2 (20)
Religion			
Christianity	10 (100)	9 (90)	9 (90)
Islam	-	1 (10)	1 (10)
Family type			
Monogamous	4 (40)	8 (80)	6 (60)
Polygamous	3 (30)	2 (20)	2 (20)
Divorced home	1 (10)	-	2 (20)
Single parent	2 (20)	-	-
Duration of Illness			
2 weeks to 1 month	3 (30)	1 (10)	4 (40)
1 month to 3 months	3 (30)	4 (40)	2 (20)
3 months to 6 months	3 (30)	2 (20)	3 (30)
6 months to 1 year	1 (10)	2 (20)	1 (10)
1 year to 2 years	-	1 (10)	-
Type of drugs used			
Alcohol	5 (50)	5 (50)	2 (20)
Cannabis Sativa	2 (20)	4 (40)	5 (50)
Codeine	1 (10)	-	-
Cocaine	1 (10)	-	-
Methamphetamine	1 (10)	1 (10)	3 (30)
Occupation			
Employed or self-employed	4 (40)	5 (50)	3 (30)
Unemployed	6 (60)	5 (50)	7 (70)