

Original Article

Effectiveness of Cognitive-Behavioral Stress Management Therapy on Emotional Regulation Difficulties and Craving among Men Undergoing Methadone Maintenance Treatment: A Randomized Clinical Trial Study

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Received: 20 Jan 2026; Revised: 18 Feb 2026; Accepted: 25 Feb 2026

Abstract

Background and Aim: Emotional problems and the lack of control over one's emotions are among the most significant factors that lead to substance use disorders. Craving is a major risk factor that can increase the risk of relapse in patients undergoing methadone treatment. Consequently, the present study was conducted to investigate the impact of cognitive-behavioral stress management therapy on difficulty in emotion regulation and drug craving among male patients undergoing methadone treatment.

Materials and Methods: This study was a randomized clinical trial design with a control group performed in two stages, pre-test and post-test. The study instruments were the DISEASE Emotion Regulation Scale and the Desires for Drug Questionnaire. The study sample included 30 male patients undergoing methadone treatment who were randomly divided into an experimental group (n = 14) and a control group (n = 12). The SPSS-26 and MANCOVA software were used to analyze the data.

Results: Multivariate analysis of covariance indicated that the cognitive-behavioral stress management intervention substantially helped the patients to overcome their difficulty in emotion regulation and craving η^2 for difficulty in emotion regulation and craving were 0.51 ($P < 0.01$) and 0.77 ($P < 0.01$), respectively.

Conclusion: Stress management therapy based on a cognitive-behavioral approach is an effective therapy for alleviating emotional difficulties and reducing craving in individuals receiving methadone treatment. Additionally, it is considered an effective method for overcoming emotional regulation difficulties and craving addiction.

Keywords: Emotion regulation; Craving; Stress management; Cognitive-behavioral therapy

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Please cite this article as:

Rezaei, Z., Ghazanfari, F. & Rezaei, F. Effectiveness of Cognitive-Behavioral Stress Management Therapy on Emotional Regulation Difficulties and Craving among Men Undergoing Methadone Maintenance Treatment: A Randomized Clinical Trial Study. *Int. J. Appl. Behav. Sci.* 2026;13(1):11-19

Introduction

Substance use disorder (SUD) is a diagnostic term referring to recurrent drug use that results in functional and clinically significant impairment, including health complications, disability, and an inability to fulfill social and daily obligations (1). According to World Health Organization reports, approximately 3.5% to 5.7% of individuals aged 15–64 globally report illicit drug use. It is estimated that 10% to 15% of these individuals develop dependence or a pattern of harmful use, with higher prevalence rates among men than women (2). In Iran, the prevalence rates of alcohol and drug abuse have been reported at 9% and 14%, respectively. Given the high prevalence of opioid use and the associated psychological comorbidities, effective treatment interventions are critical (3).

Methadone maintenance therapy (MMT) is a primary pharmacological intervention for patients seeking recovery. Methadone is typically administered orally to alleviate withdrawal symptoms (4). Despite adherence to MMT, many patients continue to experience persistent drug cravings (4), and the intensity of these cravings is a pivotal determinant of relapse probability. Empirical evidence suggests that more intense cravings are strongly correlated with a higher likelihood of relapse (5, 6). Despite extensive efforts in addiction treatment, relapse rates remain concerning (7); for instance, Friedman *et al.* (8) reported that only 20–50% of patients maintain abstinence after one year. Consequently, cravings—which may be conscious or unconscious—serve as a significant trigger for relapse and may contribute to the prolonged use of methadone among those in treatment (9).

Conversely, in individuals undergoing methadone therapy, a deficiency in emotional regulation is a significant factor linked to relapse and addiction risk (10). Individuals with substance use disorders often utilize drugs to avoid, suppress, or deny negative affect. Instead of employing adaptive coping mechanisms, they frequently attempt to escape distress through substance use (11, 12). Essentially, substance use often becomes an unintentional, maladaptive strategy for mood regulation or avoidance of negative emotions (11, 12). Research

indicates that emotional regulation is linked to success in various life domains (13), and individuals who exhibit robust emotional regulation are more capable of withstanding interpersonal pressure (14). Furthermore, they demonstrate greater resistance to substance use, as they can better recognize maladaptive interpersonal demands and manage their internal emotional states effectively (15).

Despite the benefits of maintenance treatment, which reduces complications associated with substance use and protects at-risk populations, this treatment—like other pharmacological interventions—may produce several side effects for users, including drug tolerance, physical dependence, methadone toxicity, and methadone withdrawal syndrome (3). Therefore, the use of complementary therapeutic approaches with fewer disadvantages and greater benefits is particularly important for these patients. One of the most effective approaches for addressing psychological difficulties among individuals with substance use disorders is cognitive-behavioral stress management (CBSM). Stress management refers to an individual's ability to reduce stress and adapt effectively to stressful situations (16). The CBSM program integrates various techniques—such as relaxation training, guided imagery, and anxiety-reduction strategies—with traditional cognitive-behavioral methods, including cognitive restructuring, coping skills training, assertiveness training, and anger management (17).

Emotional disturbances associated with addiction often contribute to negative automatic thoughts, rumination, and catastrophic interpretations of stressful events. These cognitive patterns intensify emotional distress and increase the likelihood of compulsive drug use (10). CBSM interventions help individuals identify and challenge such distorted thoughts. As a result, the influence of dysfunctional cognitions is reduced, more realistic thinking patterns are developed, and emotional regulation improves (17). Another factor contributing to emotional dysregulation is hyperactivity of the sympathetic nervous system. Within the CBSM program, individuals learn skills such as progressive muscle relaxation and diaphragmatic breathing. These techniques help reduce sympathetic nervous system arousal while enhancing parasympathetic activity, which in turn decreases emotional arousal and promotes greater mood stability (16).

Drug craving during methadone maintenance treatment is also associated with the use of maladaptive coping strategies, particularly emotion-focused and avoidance-based coping (e.g., leaving the stressful situation). In such cases, drug use may be perceived as a way to escape negative emotional states. However, the CBSM approach emphasizes the development of problem-focused coping skills. Participants are trained to identify stress-provoking situations clearly, generate alternative solutions, evaluate these options, and select the most appropriate course of action. This structured decision-making process reduces impulsive responses and strengthens individuals' ability to cope with stress more effectively (16).

To date, several studies have examined interventions such as mindfulness-based stress reduction and integrated cognitive-behavioral therapy with mindfulness among individuals receiving methadone treatment. However, these approaches differ from CBSM both theoretically and therapeutically, and the mechanisms through which they exert their effects may also differ. The aim of the present study was not to compare CBSM with these interventions, but rather to examine whether CBSM—given its effectiveness in other clinical populations—can improve emotion regulation difficulties and reduce craving among men receiving methadone maintenance treatment.

Methods

This study was conducted as a randomized clinical trial. The statistical population consisted of all male patients undergoing methadone maintenance treatment (MMT) in Kermanshah, Iran, during 2024–2025. Initially, 43 individuals were screened for eligibility. After reviewing the inclusion and exclusion criteria and conducting clinical interviews, 30 participants were deemed eligible and enrolled in the study.

A restricted randomization method (18) was used to allocate participants to the experimental and control groups. Eligible participants were selected through random sampling, ensuring that each individual had an equal probability of being included in the study. For group allocation, 30 balls were prepared—15 representing the experimental group and 15

representing the control group—and placed in a container. The balls were then randomly drawn without replacement, and the order of selection was recorded. To ensure allocation concealment, the randomization sequence was placed in sealed envelopes.

Consistent with previous studies, efforts were made to ensure comparability between the two groups. Accordingly, no significant differences were observed between the experimental and control groups with respect to demographic characteristics and baseline variables. Data collection was conducted at two time points: pre-test and post-test.

The inclusion criteria were as follows: male gender; age between 25 and 55 years; residence in Kermanshah, Iran; a minimum two-year history of opioid dependence based on DSM-5 criteria; receiving methadone maintenance treatment for at least three months; a stable methadone dose (30–120 mg/day) for at least one month; ability to read and write in Persian; willingness to participate and provide informed consent; and absence of severe psychotic symptoms.

The exclusion criteria included a current DSM-5 diagnosis of bipolar disorder, schizophrenia, or other psychotic disorders; current suicidal ideation (assessed through clinical interview); severe cognitive impairment; concurrent participation in other psychotherapeutic interventions; prior training in cognitive-behavioral stress management; a positive urine drug screen for illicit substances at baseline; and severe medical conditions that could interfere with participation.

The dropout criteria included missing more than two consecutive treatment sessions, failure to complete the post-test assessment, withdrawal of consent, or relapse into regular illicit drug use.

Participants were randomly assigned to either the intervention group or the control group. The intervention group received ten 90-minute sessions of cognitive-behavioral stress management training. The content of these sessions is presented in Table 1.

The control group consisted of participants who did not receive any psychological intervention during the study period. Following the completion of the intervention, all participants completed the relevant questionnaires again as a post-test assessment. During the course of the study, one participant from the intervention group and three participants from the control group withdrew from

the study. Consequently, the final sample included 14 participants in the intervention group and 12 participants in the control group.

Figure 1 illustrates the study flow, from the initial assessment and participant allocation to the final follow-up stage.

Table 1. Content of the Treatment Sessions

Session number	Session content
1	Introduction to the training program, the stress component, and the first muscle relaxation exercise for 16 muscle groups
2	Effects of stress, exercises to raise awareness of the physical symptoms of stress, and exercises for gradual muscle relaxation that target eight muscle groups rather than sixteen
3	The relationship between emotions and thoughts, emotions and physiological sensations, and how to alter your assessments under pressure to prevent negative thoughts
4	Determining the type of distortions, identifying negative thoughts, and combining imagery, diaphragmatic breathing, and muscle relaxation.
5	Learning to distinguish between rational and irrational self-talk, recognizing and identifying each and learning five steps to replace negative thoughts
6	An introduction to both successful and unsuccessful coping mechanisms, learning which coping mechanism works best for certain situations, and determining each member's unique coping style
7	Teaching an effective coping program, choosing appropriate coping strategies, and teaching the "softening" technique that helps in accepting stressful situations
8	Members' awareness of their specific responses and patterns related to their anger, anger control training, and introduction to meditation, mantra meditation practice
9	Instruction on assertive behavior's steps and challenges, effective communication, and problem-solving techniques for handling conflict
10	Completing a post-test, evaluating the students' improvement, and summarizing the information from earlier sessions

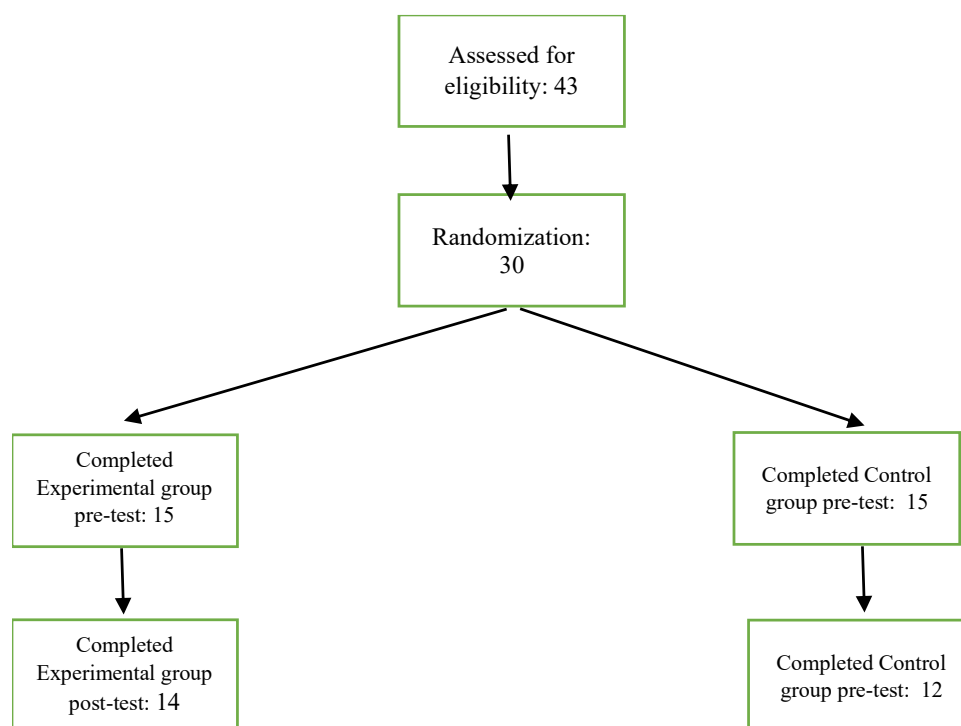


Figure 1. Diagram illustrating numbers of participants in pre-test and post-test phases

Demographic characteristics

In this section, characteristics such as age, education status, marital status, and residence status were examined.

Desire for Drug Questionnaire (DDQ)

The Desire for Drug Questionnaire (DDQ) was developed by Franken *et al.* to assess drug craving as a motivational state. The instrument measures the individual's desire for drugs in the present moment and consists of 14 items. The questionnaire yields a total score, and previous research has shown strong correlations among its subscales. In a study conducted by Mokri *et al.* (19), the internal consistency coefficients of the questionnaire's subscales among substance users were reported as 0.89, 0.79, and 0.81. In the present study, internal consistency was also evaluated using Cronbach's alpha, which indicated a reliability coefficient of 0.81 for the total scale.

Difficulties in Emotion Regulation Scale (DERS)

The Difficulties in Emotion Regulation Scale (DERS), developed in 2004, is a comprehensive instrument designed to assess difficulties in emotion regulation based on mindfulness- and acceptance-based conceptualizations of emotion regulation. This self-report measure consists of 36 items and evaluates both general levels of emotion regulation difficulties and specific aspects of these difficulties.

The scale is sensitive to changes over time, even in short-term interventions, and has been shown to be an effective instrument for detecting changes in emotion regulation difficulties following psychological treatments, including mindfulness-based interventions (20).

The DERS includes six dimensions: non-acceptance of emotional responses, difficulties engaging in goal-directed behavior, impulse control difficulties, lack of emotional awareness, limited access to emotion regulation strategies, and lack of emotional clarity. Responses are rated on a five-point Likert scale. Items 1, 2, 3, 6, 7, 8, 10, 17, 20, 22, 24, and 34 are reverse-scored. In the original validation study, the scale demonstrated high reliability, with a Cronbach's alpha of 0.93 and a test-retest reliability coefficient of 0.88, supporting its construct and predictive validity. The scale has also been translated and standardized in Iran. In the Iranian validation study, test-retest

reliability coefficients ranged from 0.91 to 0.97, while Cronbach's alpha coefficients ranged from 0.66 to 0.88 across subscales. The Persian version demonstrated acceptable validity and reliability based on reported construct and criterion validity (21). In the present study, Cronbach's alpha for the total scale was 0.79.

Statistical Analysis

Data were analyzed using SPSS version 26. The normality of the data distribution was assessed using the Kolmogorov-Smirnov test. Descriptive statistics included frequencies, percentages, means, and standard deviations. For inferential analysis, multivariate analysis of covariance (MANCOVA) was employed.

Results

Table 2 shows the individuals' demographic information, including gender, marital status, location of residence, and age range. The chi-square and independent t-test findings show that there is no significant difference in demographic variables between the two groups. Table 3 presents the mean and standard deviation for the participants on the scales.

Prior to conducting the multivariate analysis of covariance (MANCOVA), the necessary statistical assumptions were examined. The results of the Kolmogorov-Smirnov test indicated that the dependent variables were normally distributed in both the pre-test and post-test phases ($p > 0.05$). In addition, the results of Levene's test showed that the assumption of homogeneity of variances across the two groups was satisfied ($p > 0.05$). Furthermore, Box's M test was used to examine the equality of the variance-covariance matrices of the dependent variables across the groups. The results indicated that this assumption was met, suggesting that the observed covariance matrices for the intervention and control groups were equal (Box's $M = 1.838$, $p = 0.643$). The results of the multivariate analysis of covariance are presented in Table 4.

The results presented in Table 4 indicate a significant Wilks' Lambda effect. After controlling for the pre-test scores, a significant difference was observed between the experimental and control groups on the combined dependent variables at post-test. This finding suggests that the two groups differed significantly on at least one of the dependent variables included in the study.

Moreover, the effect size ($\eta^2 = 0.84$) indicates that, after controlling for the covariates, 84% of the variance in the combined dependent variables can be attributed to group membership. Following the significant multivariate effect, univariate analyses of covariance (ANCOVA) were conducted to examine whether the independent variable (the intervention) had a significant effect on each dependent variable separately. The results of these analyses are presented

in Table 5. As shown in Table 5, cognitive-behavioral stress management therapy led to a significant improvement in difficulties in emotion regulation and drug craving among men undergoing methadone treatment. After controlling for pre-test scores, the covariate did not have a significant effect on the dependent variables, indicating that baseline differences among participants did not significantly influence the post-test outcomes.

Table 2. Demographic Characteristics of the Participants

Variable	Intervention Group n (%)	Control Group n (%)	Test Statistic	p-value
Marital Status				
Single	4 (26.83)	3 (20.84)		
Married	11 (73.19)	12 (79.16)		
			$\chi^2 = 0.005$	0.942
Age (years)	42.32 $\pm$ 4.11	40.52 $\pm$ 7.92	t = -1.80	0.79

Table 3. Means and Standard Deviations of Difficulty in Emotion Regulation and Desire for Drug Scores in Pre-test and Post-test for Treatment and Control Groups

Dependent Variable	Group	Pre-test (M $\pm$ SD)	Post-test (M $\pm$ SD)
Difficulty in Emotion Regulation	Treatment	130.64 $\pm$ 20.15	84.21 $\pm$ 16.90
	Control	131.58 $\pm$ 21.91	127.33 $\pm$ 17.59
Craving	Treatment	37.07 $\pm$ 5.38	23.07 $\pm$ 3.83
	Control	35.50 $\pm$ 4.23	38.17 $\pm$ 5.54

Table 4. Results of Multivariate Tests

Effect	Test	Value	F	Hypothesis df	Error df	p-value	η^2	Power
Group Membership	Pillai's Trace	0.92	13.54	8	9	0.0001	0.84	1
	Wilks' Lambda	0.07	13.54	8	9	0.0001	0.84	1
	Hotelling's Trace	12.04	13.54	8	9	0.0001	0.84	1
	Roy's Largest Root	12.04	13.54	8	9	0.0001	0.84	1

Table 5. Tests of Between-Subjects Effects

Dependent Variable	Sum of Squares	df	Error df	Mean Square	F	Partial η^2	p-value	Adjusted Means Control Group	Adjusted Means Experimental Group
Difficulty in Emotion Regulation	6227.506	1	16	6227.506	16.99	0.51	0.001	124.82	86.36
Non-acceptance of emotional responses	258.848	1	16	258.848	21.15	0.56	0.001	22.14	14.30
Difficulty engaging in goal-directed behavior	302.131	1	16	302.131	19.70	0.55	0.001	23.13	14.66
Impulse control	300.189	1	16	300.189	18.24	0.53	0.001	22.93	14.48

Dependent Variable	Sum of Squares	df	Error df	Mean Square	F	Partial η^2	p-value	Adjusted Means Control Group	Adjusted Means Experimental Group
difficulties									
Lack of emotional awareness	223.580	1	16	223.580	14.16	0.47	0.002	20.73	13.44
Limited access to emotion regulation strategies	218.486	1	16	218.486	12.75	0.44	0.003	21.76	14.56
Lack of emotional clarity	214.793	1	16	214.793	8.52	0.34	0.01	22.07	15.04
Craving	1166.88	1	16	1166.88	55.63	0.77	0.001	39.05	22.35

Discussion

The present study aimed to examine the effectiveness of cognitive-behavioral stress management therapy. The results indicated that this intervention significantly improved difficulties in emotion regulation among patients undergoing methadone treatment. This finding is consistent with previous studies that have demonstrated the effectiveness of emotion-focused stress management interventions in improving emotion regulation (22, 23).

One possible explanation for this finding is that a central mechanism underlying the effectiveness of cognitive-behavioral stress management in improving emotional functioning involves the identification and modification of dysfunctional cognitive patterns. During therapy, individuals learn to identify distorted or catastrophic thoughts, question their validity, and evaluate alternative interpretations. This process facilitates the modification of maladaptive cognitions and, consequently, contributes to improvements in emotional functioning (24). Another important component of this treatment is helping individuals reduce their resistance to difficult emotions and become more willing to experience them rather than avoiding or suppressing them. During therapy, participants learn that attempts to suppress unpleasant emotions often intensify these experiences and may perpetuate maladaptive behavioral cycles, including

impulsive behaviors (25, 26). Furthermore, the intervention helps individuals become more aware of their emotional experiences and develop a deeper understanding of their psychological functions. Participants are introduced to the idea that emotions are not inherently good or bad; rather, their impact largely depends on how they are interpreted and managed. For example, anxiety may be detrimental when it interferes with performance and daily functioning. However, when properly regulated, it can serve as a motivating force that promotes preparation, concentration, and personal growth. From this perspective, individuals learn to recognize emotional signals and respond to them in more adaptive ways (27, 28). Another important technique used in cognitive-behavioral stress management is the incorporation of mindfulness and meditation practices. From this perspective, one of the major contributors to emotional distress is cognitive fusion, a process in which individuals treat their thoughts as objective reality. During therapy and mindfulness exercises, participants are encouraged to observe their thoughts without becoming entangled in them or attempting to suppress them. Through this process, individuals gradually develop the understanding that thoughts are simply mental events rather than accurate representations of external reality. This awareness can reduce the intensity of unpleasant emotional experiences and promote greater psychological adjustment (29). Consistent with

previous research, the findings of the present study showed that patients undergoing methadone treatment experienced a significant reduction in drug craving following cognitive-behavioral stress management therapy (30, 31). One possible explanation for this finding is the role of social relationships in relapse and craving. Previous studies have indicated that the absence of supportive social networks is a major factor contributing to relapse, whereas involvement in dysfunctional or substance-using social networks increases the likelihood of returning to drug use (5, 6). During treatment, participants learn to reduce high-risk interpersonal interactions and strengthen supportive social relationships, which may contribute to a reduction in drug craving (27).

Another important mechanism underlying the effectiveness of the cognitive-behavioral stress management approach in reducing craving involves challenging dysfunctional beliefs about the perceived benefits of drug use. Many individuals with substance use disorders believe that substance use is the only effective way to relieve emotional distress or tension. During therapy sessions, these beliefs are critically examined and gradually modified. Participants learn that although substance use may provide temporary relief, it ultimately perpetuates the cycle of addiction. Instead, they are encouraged to adopt healthier coping strategies such as physical activity, relaxation techniques, and meditation, which can reduce emotional distress and help decrease drug craving (32, 33). Another pathway through which this intervention may reduce craving is by strengthening self-control and increasing tolerance of craving-related thoughts and urges. Participants are trained to identify triggers for drug craving, including specific situations, thoughts, and environmental cues. By recognizing these triggers and applying cognitive and behavioral coping strategies, individuals can improve their ability to resist urges to use substances. Over time, attention shifts from the short-term pleasure associated with drug use to its long-term negative consequences, thereby reducing the likelihood of continued substance use (11, 12).

Conclusion

Several limitations should be considered when

interpreting the findings of the present study. First, the relatively small sample size ($N = 26$) may limit statistical power and increase the probability of Type II error.

Larger sample sizes are warranted in future research to reliably detect moderate treatment effects. Second, the inclusion of only male participants restricts the generalizability of the findings to women. Given that gender differences in emotion regulation and stress reactivity are well-documented, future studies should incorporate female participants to investigate whether they exhibit differential responses to cognitive-behavioral stress management (CBSM). Third, because participants were recruited exclusively from treatment centers in Kermanshah, the results may have limited generalizability to other geographical regions, rural populations, or individuals from different cultural backgrounds.

Fourth, the lack of follow-up assessments precludes drawing definitive conclusions regarding the long-term stability of the treatment effects. Future longitudinal research is necessary, ideally incorporating follow-up evaluations at three, six, and twelve months' post-intervention. Fifth, the reliance on self-report measures constitutes another limitation. Incorporating objective indicators—such as urine toxicology screens, physiological stress markers (e.g., heart rate variability or cortisol levels), or independent clinician ratings—would significantly strengthen the validity of future findings.

Finally, the study did not account for potential moderating variables that may influence treatment outcomes, such as addiction severity, methadone dosage, or baseline levels of emotional dysregulation. Future research should address these factors to identify the specific populations for whom CBSM is most efficacious. In summary, although this study provides preliminary evidence for the utility of CBSM in a methadone-treated population, further investigation with larger, more diverse samples is required to substantiate these results.

Acknowledgment

This article is derived from the thesis of Zeinab Rezaei, a Ph.D. student in psychology (Approval ID: IR.UL.REC.1404.029).

Conflict of Interest

The authors declare that they have no conflict of interest.

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