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The Effectiveness of Emotion Regulation Training on the Recognition of Emotional States and Social Cognition in Methamphetamine Abusers

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Abstract

Background: One of the significant problems in human societies that has existed for a long time — and whose dangers have become more evident today — is the issue of addiction. Unfortunately, this problem has assumed more serious dimensions in our communities. One of the challenges faced by methamphetamine abusers is a disorder in emotion regulation, social cognition, and recognition of emotional states.

Objectives: In this regard, the purpose of this research was to investigate the effect of emotion regulation training on the recognition of emotional states and social cognition in methamphetamine abusers.

Patients and Methods: This research is classified as applied in terms of purpose and quasi-experimental in terms of design, using a pre-test and post-test format with a control group. The study sample consisted of 30 methamphetamine abusers who referred to the TC treatment center (TC) of the Baran Institute in Tabriz in 2024. Sampling was done purposefully, and 15 individuals were randomly assigned to the experimental group and 15 to the control group. To collect data, Bakker's Emotional Processing Questionnaire (2007) and Chen and Lin's Social Cognition Questionnaire (2019) were used. A pre-test was administered to both groups, after which the experimental group received an emotion regulation training protocol over 8 sessions. The research hypotheses were tested using the univariate covariance method.

Results: The research findings confirmed the hypotheses and indicated that emotion regulation training had a positive and significant effect on the recognition of emotional states and social cognition in methamphetamine abusers, increasing the levels of these variables ($P < 0.05$).

Conclusions: This study demonstrated that emotion regulation training improved the recognition of emotional states and social cognition in methamphetamine abusers. Therefore, by offering effective strategies in this area, meaningful steps can be taken to reduce the problems faced by drug abusers.

Keywords: Emotion Regulation, Recognition of Emotional States, Social Cognition, Methamphetamine

1. Background

Substance abuse and its effects on mental health are among the most significant problems affecting families and communities (1). Methamphetamine is one of the addictive substances that can have serious effects on both physical and mental health (2). The role of emotional regulation in various disorders is well recognized (3, 4). Substance abuse is often discussed as a maladaptive strategy for coping with distress, negative emotions, and moods such as anger, sadness, or fear (3). Research indicates that individuals with a history of methamphetamine use have difficulty with the cognitive regulation of emotions (3, 4). Disorders such as anxiety, depression, aggression, hostility, and irritability may reflect deficits in emotional regulation associated with chronic methamphetamine abuse (5). Emotion regulation generally refers to any operation that affects the responses generated during emotion processing (5).

Recognition of emotional states involves the ability to identify and understand one's own and others' emotional states. This includes paying attention to body cues, facial expressions, voice, and nonverbal cues observed during social interactions and interpersonal communication. Recognizing emotional states helps us understand when a person is in a certain emotional state, such as anger, happiness, worry, or anxiety (6). Recognizing facial emotional states is a crucial factor in social communication, and deficiencies in this ability can strongly affect the quality of social interactions. Several studies have reported problems with recognizing faces and decoding facial emotions in substance abusers, especially stimulant abusers (7). Physiological changes in the structure and function of the brain, particularly in the frontal lobe of methamphetamine abusers, lead to disorders in social cognition and recognition of emotional states. Although the initiation of methamphetamine use is associated with a desire to socialize, chronic use is linked to increased depression, aggression, and social isolation, behaviors associated with the frontal lobe (8, 9).

Emotion recognition precedes emotion regulation, and emotion regulation is possible only after emotion recognition occurs. If emotional recognition does not occur, there is nothing to regulate. Recognizing emotions is a skill that can be taught (10). Some research suggests that difficulty in recognizing anger is a consequence of methamphetamine use, leading to disorders in understanding interactions with others (9). Methamphetamine dependence is associated with social cognition deficits with large effect sizes that are clinically significant. Addiction alters social cognitive functions (11). Social cognition can be defined as social-cognitive and emotional processes that broadly refer to interactions with the social environment, such as responding to social stimuli and making social decisions (12). Social cognition involves specific cognitive processes that help decode basic social signals, such as emotional facial expressions, providing necessary information about mental states, making accurate understanding of facial expressions essential for social performance success (13). These problems typically impact social behavior, such as aggression and social exclusion, adding to the burden of disease associated with methamphetamine dependence (11).

Emotion regulation refers to any process or action through which a person influences their feelings or emotional expression (14). Emotion regulation training can positively affect improving social cognition in methamphetamine abusers. This training helps individuals strengthen the skills needed to recognize, understand, and manage their emotions, enabling them to establish better social relationships (15). Given the poor regulation of emotions in individuals suffering from methamphetamine abuse, emotion regulation may be a suitable target to help these individuals with their emotions, particularly in recognizing emotional states and social cognition. Conducting research on the effect of emotion regulation training on the recognition of emotional states and social cognition in methamphetamine abusers is crucial. Such research can contribute to a deeper understanding of how methamphetamine affects the brain and emotions and can inform the development of effective treatment strategies for methamphetamine abuse and related problems.

2. Objectives

The two hypotheses of this study were: (1) Emotion regulation training is effective in the recognition of emotional states in methamphetamine abusers; (2) Emotion regulation training is effective in social cognition in methamphetamine abusers. The objectives of this research were: (1) To determine the effectiveness of emotion regulation training on the recognition of emotional states in methamphetamine abusers; (2) To determine the effectiveness of emotion regulation training on social cognition in methamphetamine abusers.

3. Patients and Methods

This applied research is a parametric study in terms of the type of data and semi-experimental (quasi-experimental) research in terms of the implementation method, featuring a pre-test and post-test design with a control group. The study population included all individuals who visited a treatment center (TC) in Tabriz from August to November 2022 and were undergoing treatment. From this population, 30 subjects were selected through available sampling. These 30 individuals were randomly assigned to two groups: An experimental group and a control group. Fifteen individuals in the experimental group received the

desired intervention, while 15 individuals in the control group did not receive any intervention during the study period.

The criteria for selecting participants included an age range of 18 - 45 years, a diagnosis of addiction only to methamphetamine, absence of hallucinations and delusions, written consent to participate in the research, and no prior participation in psychotherapy programs. Criteria for leaving the treatment process in this research included: Not participating in therapy sessions for two consecutive or three non-consecutive sessions, not cooperating with the therapist, and not completing tasks suggested by the therapist. All ethical considerations of the research, such as confidentiality of names and ethical consent, were observed. All participants had the option to leave the research at any time, and the research did not entail any financial or human losses. This research has the code of ethics IR.IAU.TABRIZ.REC.1402.404.

3.1. Data Analysis

Descriptive statistical methods were used to analyze the data, and inferential statistics, including covariance analysis, were employed to test the research hypotheses. The data were analyzed using SPSS version 26 software.

3.2. Measurement Tools

3.2.1. Ekman and Friesen Emotional State Recognition Questionnaire (1976)

Facial emotion recognition (FER) was assessed using 42 images from Ekman and Friesen's facial emotion images (1976), which examine six different emotional states (sadness, happiness, fear, anger, disgust, surprise) as well as a neutral state. The subject must be able to identify each of the images and recognize and respond to the desired emotion. If the examinees provide the correct answer, a score of 1 is assigned; otherwise, a score of 0 is given. The minimum score on this questionnaire is 0, and the maximum score is 42 (16, 17).

3.2.2. Chen and Lin's Social Cognition Questionnaire (2019)

The Social Cognition Questionnaire was designed and compiled by Chin and Lin to measure social cognition. This questionnaire consists of 3 questions and measures social cognition using a 7-option Likert scale. The minimum score on this questionnaire is 3, and the maximum score is 21. The Cronbach's alpha coefficient calculated for this questionnaire in the research was estimated to be above 0.7 (18).

3.3. Emotion Regulation Training Protocol

In this research, the emotion regulation training protocol was developed and implemented for the experimental group over 8 sessions, with each session lasting 90 minutes, conducted once a week, as follows:

3.3.1. Session 1

Introduction and Relationship Building: Establishing rapport and initiating the relationship. Stating the primary and secondary goals and discussing the objectives. Explaining the logic and stages of the intervention. Outlining the framework and rules for participating in the meetings.

3.3.2. Session 2

Providing emotional education on the recognition of emotions and situations that elicit them, understanding the differences in the performance of various types of emotions, and offering information about the different dimensions of emotions and their short-term and long-term effects.

3.3.3. Session 3

Providing emotional education on the recognition of emotions and situations that elicit them, understanding the differences in the performance of various types of emotions, and offering information about the different dimensions of emotions and their short-term and long-term effects.

3.3.4. Session 4

Creating changes in situations that trigger emotional responses, preventing social isolation, and teaching interpersonal communication skills.

3.3.5. Session 5

Teaching that situations do not directly affect emotions and that cognitive processes mediate the pathway between situations and emotions. This includes cognitive reappraisal training.

3.3.6. Session 6

Changing cognitive evaluations, identifying incorrect evaluations and their effects on emotional states, teaching re-evaluation strategies, and encouraging consideration of situations from different perspectives.

3.3.7. Session 7

Altering the behavioral and physiological consequences of emotions, identifying the extent and manner of using inhibition strategies and examining their emotional consequences. This session includes exposure, emotion expression training, behavior modification through changing environmental reinforcers, emotional discharge training, relaxation, and reverse action.

3.3.8. Session 8

Re-evaluating and removing barriers to application, assessing the level of achievement of individual goals, applying learned skills in natural environments outside the session, and examining and removing barriers to completing homework.

4. Results

All participants were male. In the control group, 6 subjects were single and 9 subjects were married. In the experimental group, 8 subjects were single and 7 subjects were married. Table 1 provides information about the age of the subjects. Table 2 presents the statistical description of social cognition and recognition of emotional states, separately for the experimental group and the control group.

The normality of the variables was assessed using the Kolmogorov-Smirnov test. The significance probability of the variables was greater than the significance level of the test (0.05), indicating that the assumption of normality for the research variables was accepted. Levene's test was used to assess the equality of variances. Given that the significance level of the research variables was greater than 0.05, it can be concluded that the data did not reject the assumption of equality of variances; in other words, the condition of equality of variances was met.

According to the analysis of covariance for the variable of recognition of emotional states and social cognition in the experimental and control groups, the difference between them is statistically significant based on the significance level and the F statistic. Therefore, there is a significant difference between the post-test scores for recognition of emotional states and social cognition in the emotion regulation training group and the post-test and pre-test scores of the control group and the pre-test for emotion regulation training. Additionally, according to the average of the variables, this difference is evident between the post-test group and the same group receiving emotion regulation training. In other words, individuals who received emotion regulation training demonstrated greater social cognition than the control group. Emotion regulation training increased the social cognition of methamphetamine abusers. Similarly, individuals who received emotion regulation training showed greater recognition of emotional states than the control group. Emotion regulation training increased the recognition of emotional states in methamphetamine abusers (Tables 3 and 4).

5. Discussion

The first purpose of this study was to determine the effectiveness of emotion regulation training on the recognition of emotional states in methamphetamine abusers. The findings showed that emotion regulation training increased the recognition of emotional states in methamphetamine abusers. This finding is consistent with previous research (3, 15). The ability to accurately identify emotions and their meaning is a key component of emotion regulation. Accurate inference of facial emotional states is essential for regulating emotional states in various social contexts, and problems related to social and behavioral skills stem from misinterpretation of facial emotions (19). Previous studies have suggested that individuals with methamphetamine use have impaired emotion recognition. This impairment may be related to deficits or biases in interpreting social information, particularly difficulty in understanding the emotions of others. This ability is important for social functioning because it leads to appropriate social communication and the development of successful relationships (9, 20). Training in emotion regulation skills may also be beneficial for co-occurring disorders in people with methamphetamine abuse. Given that the content of the emotion regulation training protocol includes recognizing emotions, arousal situations, differences in types of emotions, training in expressing emotions,

Table 1. Frequency Distribution of the Age of the Subjects

Variables	Control Group (No.)	Experimental Group (No.)	Control Group (%)	Experimental Group (%)	Total (%)
Age (y)					
18 - 25	3	4	20	26.7	23.3
26 - 35	7	8	46.7	53.3	50
36 - 45	5	3	33.3	20	26.7

Table 2. Description of Pre-test and Post-test Scores of Social Cognition and Recognition of Emotional States [a]

Variables	Experimental Group	Control Group
Social cognition pre-test	8.269 ± 2.789	8.666 ± 2.380
Social cognition post-test	13.266 ± 3.369	7.533 ± 2.065
Recognition of emotional states pre-test	13.000 ± 3.401	12.266 ± 2.658
Recognition of emotional states post-test	19.266 ± 3.918	11.200 ± 2.111

[a] Values are expressed as mean ± SD.

Table 3. The Results of Covariance Analysis of the Variable of Recognition of Emotional States in the Experimental and Control Groups (Post-test)

Source of Changes	Sum of Squares	Degree of Freedom	Mean Sum of Squares	F Statistic	Significant Probability
Modified model	12.8457	2	356.422	183.277	0.000
Group	402.917	1	402.917	207.129	0.000
Error	52.522	27	1.945	-	-
The whole	7727	30	-	-	-
Corrected total	765.367	29	-	-	-

behavior modification through changing environmental reinforcers, and emotional discharge training, participants in the present study were trained during the first, second, seventh, and eighth sessions. Emotion regulation training is a process of self-regulation that teaches people to control their emotions in response to their environment. This process can include any coping strategy (adaptive or maladaptive) that a person uses when facing stressful situations (9, 21-24). People regulate emotions to avoid or reduce the experiential or behavioral aspects of negative emotions such as anger, sadness, and shame. Even in different social situations, positive emotions may also be regulated (9). People who chronically use methamphetamine, whether they seek treatment for their addiction, have problems such as anxiety, depression, aggression, hostility, and irritability, and such disorders may reflect deficits in emotion regulation associated with methamphetamine abuse (5).

The second purpose of this study was to determine the effectiveness of emotion regulation training on social cognition in methamphetamine abusers. The findings showed that emotion regulation training increased social cognition in methamphetamine abusers. This finding is consistent with previous research (3, 9, 15). Impairment in FER is a specific domain of social cognition that is consistently seen in methamphetamine abusers (9, 13). The amygdala and frontal regions play an important role in emotion processing and social cognition in methamphetamine users (8, 9, 25). Emotion regulation training improves emotion regulation by affecting the frontal and prefrontal regions (26). People with substance-use disorders have higher levels of negative emotions and have negative biases in the way they process emotional facial expressions. Studies have shown impaired emotion regulation compared to people without substance abuse. It is possible that emotional dysregulation is both a risk factor and a consequence of addiction (3). In the present study, during the third

Table 4. The Results of Covariance Analysis of the Variable of Social Cognition in the Experimental and Control Groups (Post-test)

Source of Changes	Sum of Squares	Degree of Freedom	Mean Sum of Squares	F Statistic	Significant Probability
Modified model	421.703	2	210.851	130.882	0.000
Group	279.053	1	279.053	173.216	0.000
Error	43.497	27	1.611	-	-
The whole	3710	30	-	-	-
Corrected total	465.200	29	-	-	-

session, participants were taught the role of emotions in communicating with others. Preventing social isolation, training in interpersonal communication skills, training in cognitive reappraisal, and recognizing emotions were practiced by participants in the fourth and fifth training sessions. The process of social cognition is largely regulated through emotional and cognitive functions. From the emotional aspect, people should have the ability to regulate and identify their emotions as well as identify the emotions of others. From the cognitive aspect, people must have the capacity to not only recognize and identify emotions but also have the perspective of another person to fully understand that person's beliefs, motives, and actions during a social interaction, which is the essence of social cognition (27). Both recognition of emotional states and social cognition are improved under the influence of emotional regulation and educational interventions. This effect can be attributed to emotional and cognitive changes in methamphetamine users.

The studied sample in the current research consisted only of men who used methamphetamine. This may be one of the reasons for the effect of the intended therapeutic intervention on the recognition of emotional states and social cognition, as it pertains to the male gender. Men tend to exhibit higher levels of emotional ataxia, difficulties in emotion regulation, and problems in recognizing emotional states (27). Emotion recognition is defined as the ability to understand the emotional state of another person based on a set of sensory stimuli. Emotion regulation refers to the ability to influence one's emotions. Both of these abilities are related to gender or gender differences (27).

5.1. Conclusions

According to the significance level ($P < 0.05$) and the F-statistic, and considering that there is a significant difference between the post-test scores of emotional state recognition in the emotion regulation training group and the post-test and pre-test scores of the control group as well as the pre-test scores of the emotion regulation training group, individuals who received emotion regulation training demonstrated greater recognition of emotional states than those in the control group. Additionally, there was a significant difference between the post-test scores of social cognition in the emotion regulation training group and the post-test and pre-test scores of the control group as well as the pre-test scores of the emotion regulation training group. According to the significance level ($P < 0.05$) and the F-statistic, individuals who received emotion regulation training exhibited higher levels of social cognition than those in the control group. Both research hypotheses were confirmed.

The results of the present study showed the effectiveness of emotion regulation training in improving recognition of emotional states and social cognition among methamphetamine abusers. The intervention led to positive changes in both variables. These findings support the effectiveness of emotion regulation training for individuals struggling with methamphetamine addiction. Through such training, effective steps can be taken to reduce substance abuse-related problems — especially those related to emotion regulation, emotional state recognition, and social cognition.

One of the limitations of this research was the use of self-report tools. Another limitation was that the sample consisted solely of men from a single city. It is suggested that future research employ additional methods, such as interviews. Research should also include samples from other cities and incorporate female participants, with comparative analysis of the results. Long-term follow-ups are recommended, and similar research should be conducted in other communities.

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Footnotes

Authors' Contribution: The article has been read and approved by the authors. The first author was responsible for therapy, data collection and data analysis. Second author was the responsible author and the supervisor of the thesis, and she was responsible for summarizing and writing the article. The article has been read and approved by the authors.

Conflict of Interests Statement: There is no conflict of interest, and private or government organizations did not financially support the research, and research support was not carried out.

Data Availability: The dataset presented in the study is available on request from the corresponding author during submission or after publication.

Ethical Approval: The article was extracted from the thesis of the author and it has a code of ethics number IR.IAU.TABRIZ.REC.1402.404 .

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