# The Effectiveness of Cognitive Empowerment of Mental Conditions in the Recognition of Facial Expression of Emotions in Addicts

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## Abstract

**Objective**: The aim of this study was to investigate the effectiveness of cognitive empowerment of mental states in the recognition of facial expression of emotions in substance dependent individuals. **Method:** The present study employed a quasi-experimental design with pretest/posttest design and control group. A total of 30 addicts within the same age range, education level, and employment status were selected and were randomly assigned to two groups, an experimental one and a control one (n =15). Participants responded to Benton Facial Recognition Test (BFRT) in the pre-test and post-test. The experimental group underwent TERME intervention (Training for Enhancement of Reading Mind from Eyes), but the control group did not receive any intervention. **Results:** The results of covariance analysis indicated that cognitive empowerment (TERME) is effective in the recognition of facial expressions in addicted people. In fact, the TERME program has improved the facial expression of emotions in drug-dependent people. **Conclusion:** Based on the findings of this study, TERME program can be applied to enhance the facial expression of emotions in substance-dependent individuals.

**Keywords:** cognitive empowerment, recognition of facial expression of emotions, social cognition, addiction

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## Introduction

Drug dependence is a major public health issue. In Iran, addiction is known as a chronic and recurrent disease that has a significant prevalence. Drugs contain all the compounds that change the brain function in the form of excitement, depression, abnormal behavior, anger or disturbance in judgment and consciousness. By drug dependence, we mean the use of any addictive substance that inflicts physical, psychological, emotional, and social losses on the consumer or others. Thus, the use of any prohibited substance is considered to be abusive (Ghorbani, & Molazadeh, 2014). Drug dependence is a recurrent chronic disorder that has three characteristic features, namely compulsion to search for and use substances, lack of control to restrict consumption, and the emergence of negative emotional states (such as boredom, anxiety, and restlessness), when there is no access to the substance (Koob, 2006). The lack of control over consumption highlights the neuro-cognitive dimensions of addiction. Usually, the correlates of cognitive control are found in the frontal lobe, especially in the prefrontal region. The proper functioning of the prefrontal cortex equips one with the capacity to use past experiences and knowledge to assign meaning to his/her current behavior and guide him/her to select some responses from his/her behavioral treasure in the future (Stuss, Gallup, & Alexander, 2001). In the framework of search for neurotic correlates of addictive behavioral, there are similarities, e.g. an increase in tendency to obtain immediate rewards rather than larger but delayed rewards, between substance dependent individuals' behavior and the behavior of those with prefrontal lesion (Bell, Bryson, Greig, Fiszdon, & Wexler, 2005). In addition, emotional, affective, and social changes are also observed in people with damage in prefrontal cortex. The bias toward immediate rewards, called "impulsive behavior", is also an important neurotic feature of addiction (Reynolds, 2006).

Unfortunately, despite the large number of screened drugs in randomized clinical trials, no drug has been proven effective in the treatment of cocaine addiction (Sofuoglu, & Kosten, 2006). Similarly, the efficacy of no drug has been proven in the treatment of methamphetamine addiction (Hill, & Sofuoglu, 2007) or cannabis addiction (Sofuoglu, Sugarman, & Carroll, 2010 b). It has been clearly shown that cognitive deficiencies (as a general characteristic of many psychiatric disorders) correlate with the level of social function. In addition, cognitive deficiencies play an important role in comprehensive rehabilitation programs. These programs include many therapeutic components, such as social skills training, psychological training, and job counseling. Higher scores on cognitive scales, especially attention and verbal and non-verbal memory, all predict a better response to comprehensive psychosocial treatment (Medalia, & Christopher Bowie, 2017).

Generally, based on research findings, defects in cognitive abilities normally lead people to drug use. Meanwhile, weakness in control, novelty seeking, high-

risk decision-making, memory weakness, and attention deficit are among the primary causes of addiction. Research in this field, using imaging techniques and neuro-psychological tests, has shown that substances create a severe imbalance in neuromuscular networks and leads to reduced activity of the brain regions responsible for cognitive processes, such as workload, speed of information processing, long-term memory, planning, selective processing, cognitive flexibility, and focused attention to complex tasks (Brady, Gray, & Tolliver, 2011). From this perspective, the behavioral change has been undoubtedly due to the effect of drug use on the brain and it is possible to track these brain changes by neurological tests. In fact, neurological tests are related to certain brain structures, on the one hand, and are interrelated with certain behaviors on the other hand (Nejati, Shiri, & Nouri, 2012).

Cognitive rehabilitation is a systematic intervention method for the remediation of cognitive functions of the brain with the aim of treatment of behavioral problems. To this end, most therapists use neurological tests to determine the target functional function and strengthen it through hierarchical exercises. On the other hand, the interventions designed to improve thoughts or cognitive skills are referred to as cognitive remediation. Cognitive remediation is an interventionist behavioral training whose purpose is to improve cognitive processes (attention, memory, executive functions, social cognition, and metacognition) and to reach reliability and generalizability (Medalia, & Christopher Bowie, 2017). Social cognition is also a process through which a behavior in response to a peer is created. Social cognition in humans is the product of information processing in which one perceives and analyzes himself, others, and the surrounding world (from his/her social perspective). These processing trends can take place unconsciously or consciously and are under the influence of a large number of motivational biases at the same time. Social cognition consists of three main parts, namely the perception of other individuals as separate identities, the perception of the self as a social element, and the social knowledge that enables one to execute his/her social practices (Beer, & Ochsner, 2006). Therefore, the social cognitive approach focuses on improving the defects of perspective taking (theory of mind), the recognition of non-expressed emotions, and the re-training of information processing biases, such as attention to threatening information. It is assumed that these biases produce delusional thought processes. These approaches apply the principles of repetition, modeling, role play, and corrective feedback to enhance social cognitive skills. Moreover, a range of conceptual studies has provided evidence in the field of social cognitive education where two key domains of social cognition, i.e. the recognition of facial expression of emotions and theory of mind can improve attentional prompts, verbal strategies, and instructional skills by means of relatively intensive interventions (Medalia, & Christopher Bowie, 2017).

A large amount of the information available in the social environment comes from understanding the feelings of others from their faces. Specific structures,

such as fusiform gyrus and posterior superior temporal sulcus (Schoenbaum, & Chiba, 1998) for understanding the face and its components (identity, direction of looks, and perception of an evident feeling in the face) exist in the brain. Such as the Duckling and the upper temporal groove. In other words, various studies on areas of the brain involved in social cognitive processes have shown that a network of different brain regions, which overlap in some cases, is active in mechanisms of social cognition. These regions are mainly divided into frontal and temporal lobes of the brain. It appears that there are certain areas in the brain for processing each of the sections of social cognition (self, others, and social knowledge). For example, the anterior cingulate cortex, frontal cortex regions, and medial and lower frontal lobes are involved in the information processing pertaining to the self. Amygdala, frontal-ocular gyrus and prefrontal cortex are activated in the information processing relating to others and the theory of mind. As it was mentioned above, the fusiform gyrus, superior temporal sulcus, and amygdala are more active in the information processing pertaining to facial movements. In the field of social knowledge, several areas are also involved where the role of amygdala, the inner frontal lobe, the prefrontal lobe, and superior temporal sulcus are more highlighted (Beer, & Ochsner, 2006).

Emotional recognition is defined as the ability to distinguish between different emotional states in the face, gesture, and verbal expressions in the self or others and perception of their socio-contextual meaning (Bauminger, 2002). The ability to recognize others' emotions is one of the primary skills that children need for success in social situations and growth in empathy (Halberstadt, Denham, & Dunsmore, 2001). Expression of facial emotions has a communicative function and induces certain information to the viewer. Emotion perception can be a major factor in social interactions because it enables individuals to accurately identify the goals of others and provide appropriate responses accordingly (Bal et al., 2010). Hence, emotions are among the most important sources of information in social interactions both for the interpreter of emotions and for the emotion presenter (Campos, Campos, & Barrett, 1989). The ability to identify and distinguish emotional states is a skill that grows normally in infants, and facial expressions are considered as an important source for identifying emotional states in others. This skill evolves throughout childhood (Herba, Landau, Russell, Ecker, & Phillips, 2006). The ability to interpret the emotions of others increases with aging in such a way that children aged 10 or 11 years old reach adult levels in interpreting the emotions of others (Tonks, Williams, Frampton, Yates, & Slater, 2007). If a child is incapable of codifying the emotions of others, s/he will have difficulty in friendly relationships and will exhibit strange behaviors during social interactions (Baron – Cohen, Wheelwright, Hill, Raste, & Plumb, 2001). It can be argued that recognition of facial expressions is considered as one of the important factors in social communication and the defect in this ability naturally affects the quality of social interactions due to the importance of understanding emotional states (Farran,

Branson, & King, 2011). On the other hand, one of the areas on which a limited number of studies have been done is the recognition of mental states in addicts (Nejati et al., 2012).

The ability to identify emotional states of the face and infer the mental states of others is one of the most important social skills. Disruption of mind reading skill and recognition of facial gestures in the consumers' minds result in misunderstandings and degradation of interpersonal interactions and, thereby, this brings about increased violence and interpersonal conflicts and, ultimately, social isolation for the drug user. These changes in social-emotional behaviors can increase the negative mood and stress in these individuals, which may be one of the causes of the drug user's relapse into addiction after addiction abstinence. Therefore, in the treatment and rehabilitation of people with addiction, the role of social cognition should be taken into account; and the recognition of social behaviors and interactions in the therapeutic programs of these individuals should be included (Homer et al., 2008). Research has shown that the facial recognition of emotions in addicts is weaker than that in normal people. For example, Nejati et al. (2012) concluded that drug users had significantly lower scores on the recognition of emotional states of happiness, sadness, and anger than healthy people. Panahi (2016) concluded that there is a significant difference between individuals taking industrial substances, conventional substances, and healthy people in terms of the facial expression recognition (anger, happiness, and sadness). Zerehi (2016) also found a significant difference between two groups of people with opioid dysfunction and non-addicts in terms of such emotion as hatred, sadness, fear, surprise, and anger. Therefore, considering the poor performance of drug users in facial expression recognition tasks, it is suggested that social cognitive functions be considered in addicts' assessment (Nejati et al., 2012). Reza'ea, & Hasanzadeh (2017) observed a significant difference between addicted people and normal people in terms of emotional processing. In this regard, Shiri, Nejati, & Pour-Etemad (2013) investigated the effectiveness of cognitive rehabilitation in the remediation of emotional states in children with high functioning autism disorder in the diagnosis of emotional states. The results showed that the subjects' performance in has improved Benton Facial Recognition Test (BFRT). That study also showed that children with autism succeeded in the remediation of the ability to recognize facial emotions by means of short-term, focused, and intensive training methods. Abadi (2015) concluded that rehabilitation (reverse imitation and imitation) improves the emotional recognition ability in autistic patients. Klin, Jones, Schultz, Volkmar, & Cohen (2002) examined autistic individuals' eye-tracking in real-life situations of social interactions, and they found that autistic individuals looked at the mouth area twice as long as looking at eyes, while the non-autistic individuals devotes an amount of time for looking at the eye three times as much as the time for looking at the mouth. This also caused the loss of emotional information to correctly recognize the facial emotional

states in children with autism. In that study, it was attempted to change the vision stabilization strategies in children with autism. In this regard, one of the basic emotional training tasks was designed specifically to help autistic children look at eyes (while staring at faces) and pay attention to emotional states of happiness, sadness, fear, and anger so that these children's defects in gaining emotional information from the eye area can be overcome, as most of the information about emotional and mental states is transmitted through the eye language (Shiri et al., 2013).

With regard to the above-mentioned points and due to the fact that few studies have been conducted on the interventions about improving the recognition of facial expression in addicts, the current research seeks to respond to the following question: Is cognitive empowerment of mental conditions effective in the facial expression recognition in addicts?

## Method

### Population, Sample, and Sampling Method

All drug addicts kept in centers pertaining to Article 16 of the Counter Narcotics Law in Tehran Province in 2018 (with emphasis on amphetamine use) constituted the statistical population of this study. According to the list of centers of Article 16 of Tehran province, two centers, namely Akhavan (under the supervision of Welfare Organization) and Baharan (under the supervision of the Municipality) were randomly selected. The entry criteria were minimum education of secondary school, not suffering from any psychiatric disorders, experiencing at least 2 months of purity (since abstinence). They were all from 25 to 55 years of age. The number of 100 eligible individuals were selected; then, 30 ones of them were randomly selected and were assigned to two experimental and control groups.

### Instruments

1. Addiction Severity Index (paper version): The revised version of this test contains 106 items and 6 domains of medical status, substance use, occupation, family, legal state, and psychological domain where one's occupational, family, legal, and psychological dimensions in the last 30 days is measured in addition to the amount, duration, and severity of substance use. The predictive validity of this test was obtained between 0.76 and 0.91, and the sensitivity and specificity of the test were obtained equal to 0.85 and 0.80, respectively. Ina addition, the concurrent validity of the test was obtained equal to 0.91. The internal consistency of the scale was obtained from 0.65 to 0.89 via Cronbach's Alpha method (Khakpour et al., 2016). This questionnaire was used to obtain minimal information from the participants in the research, which included basic demographic information, history and pattern of drug use, type of treatment, and criminal behavior. In this study, only the occupation and family sections were used.

2. Recognition of Emotional Facial Expressions (Software Version): This test was constructed by Ekman and Friesen in 1978 and consists of 14 images. This test shows 6 major emotions and the respondent is required to look at each image and recognize and guess the emotion. The formal validity of this test has been verified by several researchers and its content validity of this scale has been evaluated according to clinical experts and clinical psychologists' opinions. The test retest reliability of this test has been obtained equal to 0.68 on a 30-participant sample. The above test is performed on a computer-based format and is scored by zero and one (as cited in by Shateri, 2016).

**Fig. 1: A sample of Ekman's Test Images (Recognition of Emotional Facial Expressions)**

3. Millon Clinical Multiaxial Inventory (MCMI-III): This test is a self-assessment scale with 175 items and measures 14 clinical personality scales and 10 clinical syndromes and is used to assess the psychological state of adults 18 years and older presenting to mental health centers. This test was introduced in August 1994 at the American Psychological Association. MCMI-III is the revised version of Millon Clinical Multiaxial Inventory II. Like the two previous versions of personality disorders and axial disorders, MCMI-III measures the diagnostic and statistical manual of mental disorders. This test is one of the most important instruments for assessing the objective clinical syndrome presented in Axis I and DSM-IV Axis II personality disorders. This test was designed to operationalize Millon Psychopathology Pattern (1969 and 1983) and has been revised three times since its publication in line with the modification in the theory as well as in the diagnostic and statistical guide to mental disorders. Individuals with scores greater than 85 are considered as the disorder sufferers, and those who score less than 85 are considered as non-sufferers. Of course, real knowledge of the existence or absence of a disorder is inaccessible. Hence, clinical specialists' judgment is a substitute for reality. Therefore, these statistics are used to determine the efficiency of categorization or diagnostic validity of the scales of a test, and are, in fact, complementary to traditional methods of validity assessment (convergent validity, divergent validity, etc.). Therefore, this test is one of the most popular psychological tests that has been translated into several languages and has been used in several intercultural studies. In Iran, it has been standardized three times. Khajeh Moogahi (1993) has standardized the

second edition of this test in Tehran and Sharifi (2002) has standardized its third version in Isfahan. MCMI-III was constructed on the basis of Levanger's three-step cross-validation (1957), which has been used to refine the test from item selection to scale construction, and to assess the external validity of the test by using Millon's theory as a criterion. This test has been designed to evaluate personality traits and psychological trauma. Therefore, this test can be used to make clinical decisions or to determine whether or not a person has a specific disorder or a specific psychological characteristic (Sharifi, 2006). In this regard, Sharifi, Molavi, & Namdari (2007) assessed the diagnostic validity of MCMI-III on 283 patients by calculating the agent's attributes (prevalence, sensitivity, and specificity), and predictive powers (positive, negative, and total). They reported that there is a good diagnostic value for all scales with the positive predictive power in the range of 0.92 to 0.98 scales and, the negative predictive power of the scales ranging from 93.03 to 0.99. In addition, the total diagnostic validity of the scales was in the range of 0.58 to 0.83. Therefore, this test can be used to diagnose personality disorders and clinical syndromes (Sharifi et al., 2007).

4. TERME (Training for Enhancement of Reading Mind from Eyes): This program, first designed by Vahid Nejati, has been developed to carry out research projects. Its electronic form has been prepared from the 1500 photographs taken by experts (in terms of technical photographic, neurological, and emotional principles) from the faces of Shahid Beheshti University students similar to those of Ekman's tests, Baron Cohen's test, Benton, etc. The correctness or incorrectness of the responses is assessed in four stages (starting, elementary, moderate, and advanced stages), each stage is evaluated in 3 steps by software program, and the respondents are provided with negative or positive feedback. In the first turn, images are presented in response to two options out of the 30 mental states, including sad, capricious, discouraged, worried, serious, upset, fanciful, concerned, warm-blooded, remorseful, interested, suspicious, demanding, cautious, skeptical, thoughtful, stubborn, reflective , doubtful, certain, considerate, enthusiastic, joyful, brave, accused, hostile, bored, determined, and hesitant. At this stage (starting), the respondent can choose the emotional state of eyes. The third stage proceeds with the same conditions with this difference that there are sic options where the selection of the correct image out of six options becomes difficult. It is important to note that TERME intervention program, like image No. 2, intelligently provides the person with correct or false feedback, which leads to learning the facial expression of emotions. In other words, in this study, cognitive empowerment is the ability to teach mindfulness by identifying 30 states of mind to addicted individuals so that they can answer up to 80% of the mental states presented in the therapeutic intervention protocol correctly. In this study, mental health training is done in four stages and its first six sessions have been designed based on the difficulty of mental states (easy to hard) (Nejati, 2014).

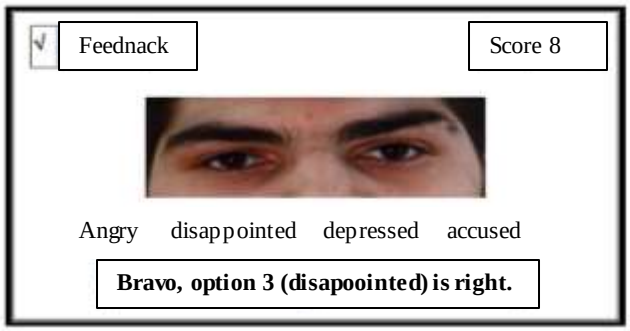


**Fig. 2: The Image Samples Presented in the Test**

## Results

In order to examine the homogeneity of the groups in terms of age, independent t-test was run, as presented in table 1.

**Table 1: Descriptive and Inferential Statistics of Independent t Test for Examining the Age Equality of Groups**

| *Groups* | *N* | *Mean* | *SD* | *t* | *Sig.* |
|---|---|---|---|---|---|
| **Experimental** | 15 | 35.60 | 7.12 | -1.112 | 0.275 |
| **Control** | 15 | 39.73 | 11.96 | | |

As it has been shown in Table 1, there is no significant difference between the two groups in terms of age (P>0.05, t= -1.112). Also, the history of opium and sap consumption was asked from all group members and the results are presented in Table 2**.**

**Table 2: Descriptive Statistics of Opium and Sap Consumption for Each Group**

| **Group** | ***Non-consumption*** | | ***Consumption*** | |
|---|---|---|---|---|
| | ***Frequency*** | ***Percentage*** | ***Frequency*** | ***Percentage*** |
| **Experimental** | 8 | 54.30 | 7 | 46.70 |
| **Control** | 9 | 60.00 | 6 | 40.00 |

The results of Chi-square test showed that the two groups were similar in terms of opium and syrup consumption (P>0.05, $\chi 2$ = 0.136). Also, the history of heroin use was asked from all group members and the results are presented in Table 3.

**Table 3: Descriptive Statistics of Heroin Use for Each Group**

| ***Group*** | ***Non-consumption*** | | ***Consumption*** | |
|---|---|---|---|---|
| | ***Frequency*** | ***Percentage*** | ***Frequency*** | ***Percentage*** |
| **Experimental** | 9 | 60.00 | 6 | 40.00 |
| **Control** | 5 | 33.30 | 10 | 66.70 |

The results of Chi-square test showed that the two groups were similar in terms of heroin consumption (P>0.05, $\chi 2$ = 2.143). Also, the history of methamphetamine use was asked from all group members and the results are presented in Table 4.

**Table 4: Descriptive Statistics of Methamphetamine Use for Each Group**

| *Group* | *Non-consumption* | | *Consumption* | |
|---|---|---|---|---|
| | *Frequency* | *Percentage* | *Frequency* | *Percentage* |
| **Experimental** | 1 | 6.70 | 14 | 93.30 |
| **Control** | 0 | 0 | 15 | 100.00 |

The results of Chi-square test showed that the two groups were similar in terms of methamphetamine consumption ($P>0.05$, $\chi 2 = 1.034$).

The descriptive statistics of the recognition of emotional facial expressions for each group and test type are presented in Table 5.

**Table 5: Descriptive Statistics Recognition of Emotional Facial Expressions for Each Group and Test Type**

| *Group* | *Mean* | | *SD* | | *N* | | *Min.* | | *Max.* | |
|---|---|---|---|---|---|---|---|---|---|---|
| | *Pretest* | *Posttest* | *Pretest* | *Posttest* | *Pretest* | *Posttest* | *Pretest* | *Posttest* | *Pretest* | *Posttest* |
| **Ekman experimental** | 25.33 | 44.13 | 11.99 | 13.35 | 15.00 | 15.00 | 15.00 | 15.00 | 62.00 | 62.00 |
| **Ekman control** | 25.53 | 28.60 | 10.32 | 11.86 | 15.00 | 15.00 | 8.00 | 15.00 | 46.00 | 54.00 |

To investigate the effectiveness of the TERME intervention (Training for Enhancement of Reading Mind from Eyes) in the recognition of emotional facial expressions, univariate covariance analysis should be used. One of the assumptions of using this analysis is the equality of error variance in two groups. In this regard, the results of Levene's test showed that this assumption has been met ($P > 0.05$, $F = 0.004$). Another assumption of this analysis is the normal distribution of variables in two groups. The results of single-sample Kolmogorov-Smirnov test showed that this assumption has been fulfilled in the pretest for the experimental group ($P>0.05$, $Z = 0.21$), posttest for the experimental group ($P>0.05$, $Z = 0.12$), pretest for the control group ($P>0.05$, $Z = 0.12$), and posttest for the control group ($P>0.05$, $Z = 0.22$). Therefore, univariate covariance analysis was run, as presented in Table 6.

**Table 6: Univariate Covariance Analysis Results Examining the Effectiveness of TERME Intervention in the Recognition of Emotional Facial Expressions**

| *Source* | *Sum of squares* | *Df* | *Mean Square* | *F* | *Sig.* | *Effect size* | *Power* |
|---|---|---|---|---|---|---|---|
| **Modified value** | 2563.50 | 2 | 1281.75 | 9.324 | 0.001 | 0.44 | 0.96 |
| **Constant value** | 1664.05 | 1 | 1664.05 | 12.106 | 0.002 | 0.31 | 0.92 |
| **Pretest** | 753.87 | 1 | 753.87 | 5.484 | 0.027 | 0.168 | 0.62 |
| **Group** | 751.21 | 1 | 751.21 | 5.465 | 0.027 | 0.168 | 0.62 |
| **Error** | 3711.46 | 27 | 137.46 | -- | -- | -- | -- |
| **Total** | 45951.00 | 30 | — | — | — | — | — |

As it has been shown in Table 5, TERME intervention has been effective in increasing the recognition emotional facial expressions (Effect size = 0.168, P >0.05, F = 5.465).

**Discussion and Conclusion**

The purpose of this study was to investigate the effectiveness of cognitive empowerment of mental states in the recognition of emotional facial expressions among drug-dependent individuals. The results of this study showed that the cognitive empowerment of mental states improves the recognition of emotional facial expressions in substance dependent individuals based on TERME program. Given the lack of research in this regard, it is not possible to compare the results. Only some studies have been conducted on the effectiveness of cognitive empowerment in the recognition of emotions in autistic individuals and their findings are partly consistent with the results of this study (Shiri et al., 2013; Abadi, Nejati, & Poreatamad, 2016). People with substance abuse have difficulty regulating their emotions (Ekhtiari et al., 2010). Research findings have shown that a low level of emotional regulation, which results from the inability to cope effectively with emotions and manage them, plays a major role in the onset of drug use (Parker, Taylor, Eastabrook, Schell, & Wood, 2008). The effective management of emotions reduces the risk of substance abuse when one is put under pressure by peers and friends for drug use. The ability to manage emotions makes it possible for an individual to use appropriate coping strategies in situations where the risk of drug use is high. People with a high level of emotion regulation are more likely to predict the wishes of others. They perceive the unwanted pressures of people around them, harness their emotions in a better manner, and, thus, are more resistant to drug use (Trinidad, & Johnson, 2002). One of the abilities that is influenced by the emotion regulation process is the ability to understand feelings, to anticipate thoughts, intentions and behaviors of others, and to experience the emotions that are created in others. This ability is referred to as empathy. New theories in the sphere of empathy have distinguished between emotional and cognitive dimensions of empathy as well as empathy itself as a social skill. The examination of defects in each of these dimensions will reveal important points regarding the treatment of people with substance abuse. In fact, empathy is an emotional or cognitive ability or a social skill that requires to receive different therapeutic interventions (Wood, Dawe, & Gullo, 2013).

Recognition of emotional facial expressions is one of the methods of social cognition that has been used in many studies. For example, Nejati (2012) has used this method to achieve social cognition. Facial expression provides a rich source of information so that the viewer can use it to create assumptions about the current emotional state of another person, which results in behavioral responses tailored to the position and, subsequently, the pursuit of individual and interpersonal functions. However, different emotional states imply different

interpersonal needs; and a proper recognition of a set of different emotional states can increase the likelihood of identifying what behavioral response we may show in the hypothesized position. Therefore, the correct recognition of emotional facial expressions is considered to be a significant social function according to considerable individual and interpersonal functions (Shenk, Putnam, & Noll, 2013).

Social cognition, in addition to having specific functions, including the interpretation of facial expressions and judgment about a social stimulus, also has a high level structure that organizes these processes. To this end, a social entity must not only be able to represent its own individual situation in relation to one another, but also must be able to reconstruct a structure with details, of the same kind as generating social stimuli. Social cognition can create a mental model through such a structure. This model is a comprehensive representation of "another person" and, as a social factor, reacts with the processor itself (Ekhtiari et al., 2010).

The findings of this study are consistent with those of Ghrobani (2018) where it has been shown that emotions, their recognition, and control play an important role in both the formation of addiction and its treatment. People who are unable to control their emotional skills are more likely to turn to drug use. The cognitive regulation of emotions is considered as the process by which individuals moderate their emotions to respond to conscious and unconscious environmental expectations. Moreover, addicted people have difficulty in identifying their own emotions and others' emotions and this makes them undergo some abnormalities in establishing affective, constructive, and conductive emotional communication with others; therefore, they may turn to drug use. Consequently, the inability to use emotions is one of the symptoms of emotional problems that prevents abstract thinking and reduces the recall of dreams, brings about difficulty in distinguishing between emotional states and body sensations, serious and formal appearance, lack of emotional effects of the face, and limited capacity for empathy and self-awareness.

Since substance dependence disorder is also associated with weakness in the recognition of emotional facial expressions, cognitive empowerment interventions can be effective in improving individuals' cognitive and emotional skills and, on the other hand, cognitive rehabilitation is a two-way interactive process. As a result, it can be argued that cognitive empowerment is a kind of learning experience that occurs between therapists and the patients in therapeutic sessions; and the aim of treatment is to improve all aspects of daily life (Abadi, 2015). In fact, rehabilitation must include all meaningful aspects, activities, situations, and interactions of a person. Therefore, the main objectives of cognitive rehabilitation are to enable people with disabilities and abnormalities to achieve their desired level of health, decrease the impact of problems on their everyday lives, and help them return to the most appropriate environments (Diller, 1987, as cited in Wilson, 2005).

Tavakolian (2014) reported that one of the factors that has recently been created in the etiology of addiction, especially in the cause of addiction relapse, is neuro-cognitive functions and the negative effects of drug use on these functions. For example; Verdejo, Garcia, Toribio, Orozoco, Puente, & Perez-Garcia (2005, as cited in Tavakolian, 2014) showed that drug use is also due to a disruption of cognitive processes, such as flexibility, and also results in the more disruption of processes. Drug use leads to the reduced function of those parts of the brain that are responsible for cognitive processes, such as decision-making and processing of emotional information, such as the recognition of emotional facial expressions and emotion regulation. In addition, the defects of these functions are among the reasons for abandoning treatment by addicts. The recognition of emotional facial expressions is one of the important factors in social communication and, thereby, the defect in this ability naturally affects the quality of social interactions due to the importance of perceiving emotional states (Farran et al., 2011). Only few studies have been carried on the recognition of mental states in addicts.

Mind reading performance of people with alcohol addiction (Uekermann, Daum, Schlebusch, & Trenckmann, 2007) and narcotic drug abusers and abusers of psychotropic drugs, such as amphetamine (Henry et al., 2009) is lower than that in healthy subjects (as cited in Nejati et al., 2012). Although some studies have shown that the lack of social interactions among substance users is due to defects in executive functions of their brain structures (Khodabakhshi, Malekpour, & Abedi, 2015). To interpret this finding, one can argue that attention should be paid to social cognition disorder, as a consequence or perhaps as the underlying cause of substance abuse, and then the aspects of prevention, treatment, and rehabilitation of addicts should be taken into account in order to return them to an effective daily social life. One of the main problems of addicted people is their inability to communicate with others and even with therapists, which ultimately disrupts the process of treatment and return to the community. However, social cognition also improves when drug abuse is the target of treatment.

At the physiological level, encounter with the facial expression of joy and anger calls for different muscle electrical reactions in the facial muscles of the person carrying the emotion (Dimberg, Thunberg, & Elmehed, 2000). This shows that people tend to process emotional facial expressions unconsciously. Human brain can distinguish among the emotional stimuli that are consciously processed. Recent studies have found that neuronal activity in human amygdala varies when one encounters different facial stimuli (Morris, Ohman, & Dolan, 1998; Whalen et al., 1998), and the recognition of facial expression gets stopped by the destruction of the amygdala (Adolphs, Tranel, Damasio, & Damasio, 1994). Research in the field of psychological neuroscience and functional imaging have identified the role of amygdala in recognizing facial expressions of fear and possibly sad mood (Calder et al., 1996; Phillips et al., 1997; as cited

in Dorri Parsa, 2015). Mitchell, Beck, Boyal, & Edwards (2011) have reported that alcoholism leads to the social problems that arise from difficulty in interpreting others' behaviors. These researchers believe that these problems are related to some issues mentioned in the theory of mind. Substance-dependent individuals obtain lower scores on the recognition of emotional expressions of happiness, fear, and wonder. Also, they showed a significant decrease in the overall score of emotional recognition (Wardjo Garcia et al., 2007, as cited in Tavakolian, 2014). Substance-dependent individuals exhibit problematic performance in emotional processing tests. Additionally, substance-dependent individuals have been associated with increased interpersonal problems, increased number of relapses, and more frequent number of alcohol detoxifications (Wardjo Garcia et al., 2007, as cited in Tavakolian, 2014).

On the whole, it seems that we can help substance-dependent individuals improve their recognition of emotional facial expressions and their social interactions by means of cognitive empowerment, such as TERME intervention. This research has been conducted on a limited sample of addicts presenting to addiction treatment centers and, thereby, caution should be exercised in generalizing the findings to other groups of the community. Among the other limitations of the present study, we can refer to a lack of related consistent and inconsistent studies in addition to the impossibility of conducting follow-ups on the samples and examining the survival of the effectiveness of the intervention. Another limitation of the present study was addicts' lack of motivation for participation in this study and the lack of control over the mere selection of methamphetamine since with approximately 90% of methamphetamine users were taking another substance at the same time. It is suggested that researchers, in light of the novelty of the subject and the research gap in addicts' cognitive abilities, carry out more and more research in this regard. In addition to measuring the effect of recognition of emotional facial expressions on addicts' social cognition, other measurement tools are also suggested to be employed.

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