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A Comparison among Emotional Memory, Emotional Styles, and Anxiety Sensitivity between Individuals with Substance Use Disorder and not Addicted People

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ABSTRACT

Background: Emotions play an important role in the tendency to abuse substances but the roles of emotional memory, emotional styles, and anxiety sensitivity in addiction have not been clarified in previous studies. The purpose of this study was to study the emotional memory, emotional styles, and anxiety sensitivity among individuals with substance use disorder.

Methods: In a prospective study, 30 patients with substance use disorder and 30 normal participants were selected by convenience sampling method from addicts who were hospitalized and outpatients who were admitted to addiction treatment camps of Ahar City. The emotional memory (verbal) test, the emotional styles questionnaire, and Anxiety Sensitivity Index- Revised (ASI-R) were used for data collection.

Results: Multivariate analysis of variance showed that there is a significant difference between the levels of emotional memory (verbal positive, negative, and neutral) and the components of emotional styles (concealing, adjusting, and tolerating) among addicted and normal individuals. However, in anxiety sensitivity, the differences between addicted and normal individuals are not significant.

Conclusion: Based on these findings, it can be concluded that emotional memory and emotional styles can be influential factors in the tendency toward substance use.

Keywords: Emotional memory, Anxiety, Substance use disorder

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Introduction

Recently, the complication of substance use disorder has turned into a transnational issue in Iran. According to the statistics, the rate of substance use disorder has been over three times higher than the rate of population growth in Iran during the past 20 years (Tavakoli et al., 2009). During the recent four decades, the prevalence of addiction disorders has been fluctuating in Iran so that it was estimated that 1,350,000 people of the population aged 15 to 64 were addicted (Sarrami et al., 2013) in 2011. Substance use disorder is a complicated, recurrent, and chronic disorder during which narcotics abuse continues in spite of its disastrous negative consequences (Jiloha et al., 2012). Emotional disturbances are among significant factors involved in both substance use disorder and continued abuse so that emotional management decreases the risk of substance use disorder and its relapse (Fatseas et al., 2011). Cognitive regulation of emotion is defined as the manner of cognitive process that a person selects at the time of encountering adverse and stressful events (Mo et al., 2018).

Addicted people abuse substances as an avoidant, negative, and ineffective strategy to reduce emotional disturbances (Sinha, 2001) in order to feel relieved from anxiety and reduce aggressive feelings (Scheier et al., 2001). In addition to a slight control over emotion and distortion of position, they also suffer from emotional indifference (De Arcos et al., 2005).

Thus, based on the Self-Medication hypothesis put forward by Goeders (2004), these individuals use a substance to overcome the actions related to stressful factors of life or to reduce the symptoms of anxiety and depression resulting from an intrusive event. The results of the studies performed by Parker et al., (2001) Heshmati, et al. (2010a, 2010b, 2011, 2017) also indicate that the low level of emotional processing that results from the inability to deal effectively with emotions when emotional management plays a vital role in the onset of substance abuse. In this regard, it is a mental and emotional behavior and after a period of rehabilitation, addicted craves intensely to use again. It is motivational because in most cases, the desire for a substance does not lead to behavior directed towards the purpose (search for substance) (Pivarunas & Conner, 2015; Etemadi-Chardah et al., 2017). Therefore, since many internal and external factors affect the substance abuse behavior, the "control" factor becomes important (Copersino, 2017). On one hand, both self-control and emotional self-regulation play important roles in emotional well-being, and on the other hand, when emotional well-being is great, individual selects appropriate coping strategies for regulating and managing emotions in the situations where the risk of substance abuse is high (Sloan et al., 2018).

In addition, recent theories have suggested that the bias in processing information of substance-inducing agents is one of the most critical aspects of the reactivity of substance symptoms in addicted individuals resulting in physiological arousal and mental desire (Carter & Tiffany, 1999) and consequently, the desire for continuous abuse and the likelihood of relapse.

Evidence suggests that substance, and in particular psycho stimulants can increase the performance of cognitive domains which affect the perception, attention, stimulation, motivation as well as learning and memory. Substance abuse may alter the effects of positive and negative memory enhancement (Tipps et al., 2014).

On the one hand, memory has a close relationship with positive and negative emotions so that positive events are better remembered comparing to negative events (Uitto et al., 2018), and on the other hand, emotions affect the quantity and quality of the information recalled from memory significantly (Uitto et al., 2018).

In this regard, memory is the emotional memory that seems to play the most important role in the interaction between memory and emotion. Through emotional memory, emotionally charged data is stored and retrieved to get used at the present time (Packard et al.,

2018), and at the time of retrieval, this emotional information in memory is more preferred over neutral information. In fact, the amygdala, which has a strong correlation with the cortical and sub-cortical regions, enhances the memory of emotional stimuli by adjusting the neuronal and hormonal systems, and knowledge and emotion are integrated in this area.

Emotional styles are the second emotional structures. Hofmann & Kashdan (2010) and Davidson (1998) have used emotional styles instead of the ways of regulating and storing emotions and they have categorized emotional styles as the styles of concealing, adjusting, and tolerating. Concealing style features include inhibition and other strategies to hide or avoid emotions after their emergence. Adjusting style introduces people who are able to acquire and utilize emotional information in solving and adjusting problems and are able to adjust and mediate emotional needs and experiences in accordance with the requirements of the context and environment. Finally, the third style (tolerating) is the characteristics of those who react to the stimulus caused by the comfortable and non-aggressive emotional experiences and are highly tolerant of stress and distress (Karashki, 2013).

In this regard, the study performed by Fox et al. (2008) conducted on people addicted to cocaine and national research carried out by Karami et al. (2017) showed that problems related to emotional styles are associated with a continued desire for substances abuse.

As the third emotional structure, the role of anxiety sensitivity tends to be more frequent than before in substance abuse. According to Taylor et al. (2007), anxiety sensitivity refers to individual differences in facing fear of a physically related arousal which increases breathing and results in dizziness and heart palpitations. The function of anxiety sensitivity is to intensify anxiety and so it can lead to the use of any psychoactive drug including substance, alcohol, and cigarette which is potential to diminish, control, or eliminate arousal, fear, or tendency toward anxious feelings to cause disaster (Taylor, 2014) which is considered as a risk factor to the creation and persistence of substance abuse and dependency.

The role of emotional memory, emotional styles, and anxiety sensitivity in addiction has not been clarified in previous researches. Thus, the present research attempts to answer the following question: Are emotional memory, emotional styles, and anxiety sensitivity different in individuals with substance use disorder compared with normal individuals?

Methods

Sample: The present research is a descriptive-correlation in terms of methodology, fundamental in terms of objective, and causal-comparative in terms of data collection design. The dependent variables of the research include "emotional memory, emotional styles, and anxiety sensitivity" and its independent variables include "substance use disorder". The statistical population of this study consisted of all addicts who are hospitalized and outpatients who are admitted to the addiction treatment camps of Ahar City. Sample of this population was selected after obtaining permission from the Department of Welfare of Ahar City, and preparing a list of all the centers and drug addiction camps in that city, and reviewing the history of patients who were diagnosed to have abused at least one psychoactive substance. The sample included 30 individuals with substance use disorder who were selected through random clustering; then these patients responded to the questionnaires of emotional memory, emotional styles, and anxiety sensitivity individually. Furthermore, 30 normal people were selected by convenient sampling method and then they completed the questionnaires. The eligibility criteria included being able to read and write in Persian, and diagnosis of substance use disorder. Exclusion criteria included having another chronic illness, or a history of psychiatric disorder. All participants provided informed consent. The objectives of the

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study were described to participants and they were assured that all questionnaires are anonymous, and participation is voluntarily.

Instruments: Emotional memory (verbal) test: This tool (Dolan & Fullam, 2010) which runs individually consists of three categories of words. The first one contains 20 positive emotional words, the second one contains 20 non-emotional or neutral words, and the third one contains 20 negative emotional words. Before the test was performed, subjects were informed about this test and they were asked to carefully read the words in order to be able to recall them after a while (they had fifteen minutes to read the words). After 2 hours, they were asked to recall whatever they read.

The reliability coefficient of this test (which is performed through open trial after a week) has been reported to be 0.64 for the emotional stage (Dolan & Fullam, 2010). In this study, Cronbach's alpha obtained from this tool was calculated to be (0.69). In Iran, this questionnaire was standardized by Meher Ali Tabar (2013). Based on Meher Ali Tabar's findings, this questionnaire has appropriate psychometric properties.

The emotional styles questionnaire: This tool was developed by Hoffman and Kashdan (2010) it includes 20 items in the three subscales of concealing, adjusting, and tolerating which include 8, 7, and 5 items, respectively. The answers are scaled as: "1. Yes, 2. No, and 3. I do not know."

As the reliability of these subscales were approved by other researchers, in a national study performed by Karashki (2013), the reliability of subscales of concealing, adjusting, and tolerating were reported to be 70%, 75%, and 50%, respectively when the total reliability equaled 81%, and the validity and reliability were satisfactory generally. In this study, Cronbach's alpha was calculated to be (0.73).

Anxiety Sensitivity Index- Revised (ASI-R): This index was presented by Taylor and Cox in 1998 to evaluate the extent of fear from signals, consequences, or designed anxiety. This tool is a self-report 36-item scale. The answer options for each question are very low, low, moderate, high, very high which are scored from 0 to 4 according to the Likert scale, respectively. Taylor and Cox examined the internal consistency of these scales and reported that alpha coefficients are in the range of 0.83-0.94. In general, studies revealed that the "Anxiety Sensitivity Index- Revised" has good validity and reliability (Moradi Manesh & Mir Jafari, 2007). This questionnaire was standardized by Moradi Mansheh and Mir Jafari (2007) in Iran. Out of 36 items, 6 items were excluded from the analysis due to their inappropriateness with the factors in which they were located. The reliability of this index was calculated based on three methods of internal consistency, test-retest, and bisection as reliability coefficients were calculated to be 0.93, 0.95, and 0.97 for the whole scale. The validity of the Anxiety Sensitivity Index-Revised was calculated through the simultaneous implementation of the Symptom Checklist-90-Revised (SCL-90-R) questionnaire, and the correlation coefficient obtained to be 0.56. The correlation coefficient between the subscales of the Anxiety Sensitivity Index-Revised and total score varied from 0.74 to 0.88, and the correlation between the subscales also varied from 0.41 to 0.86 (Moradi Manesh & Mir Jafari, 2007). In this study, Cronbach's alpha was calculated to be 0.79.

Data analysis: The data were processed using SPSS software version 22. Overall, less than 1% of items were missing. The questionnaire data were initially checked for missing item responses. Therefore, a single imputation using the expectation-maximization algorithm was utilized to replace these missing items. Missing data were imputed using Missing Values Analysis within SPSS version 22.

Data were presented by mean (M), standard deviation (SD) and frequency (%) for quantitative and qualitative variables, respectively. The

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normality of data was assessed and confirmed by one sample K-S test. Multivariate analysis of variance was applied to compare addicted individuals and normal people in variables. All the assumptions of this test were fulfilled. This study was approved by the Research Ethics Committee of Shahid Sadoughi University of Medical Sciences, Yazd-Iran. This article is the code of IR.SSU.SPH.REC.1398.154 from Research Ethics Committee.

Results

The mean scores and standard deviations of the variables in two addicted and normal groups are presented in Tables 1.

To compare the emotional memory, anxiety sensitivity, and emotional styles in these two groups, multivariate analysis of variance were used. The results are presented in Table 2.

Based on the results of Table 2, there is a significant difference between the two groups in terms of one of the dependent variables. Eta squared represents the difference of 74.2%, which indicates that 74% of the variance is related to the difference between the two groups and is due to the interaction of dependent variables.

MANOVA results were used to compare one-to-one variables. The results are presented in Table 3.

The results of Table 3 demonstrate that there is a significant difference in the amount of emotional memory (verbal positive, negative, and neutral) and the components of emotional styles (concealing, adjusting, and tolerating) among addicted and normal people with 99% confidence.

This means that people with substance use disorder remember words with negative emotional load more than normal people and remember words with a positive emotional load less than normal people; they earned a higher level in the subcomponent of concealing compared with normal people indicating that addicts are incomplete in controlling and organizing their emotions. They have lower levels of adjusting and tolerating comparing to normal individuals.

In anxiety sensitivity scores, an addicted individual does not have any differences compared with the normal individual.

Table 1. Mean scores and standard deviations of variables in addicted and normal people

Variable		Addicted people		Normal people	
		M	SD	M	SD
Verbal emotional memory	Positive verbal	2.21	1.18	5.70	2
	Negative verbal	4.90	2.14	1.53	1.43
	Neutral verbal	2.33	1.16	3.73	2.72
Anxiety Sensitivity		120.51	14.28	99.33	13.28
Emotional styles	Concealing	35.30	4.86	27.13	3.85
	Adjusting	21.13	3.81	29.27	4.27
	Tolerating	14.65	2.50	21.56	1.97

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Table 2. The results of Multivariate Analysis of Variance

Test	F	Hypothesis	Error df	Df	P	ETA
Pillais Trace	0.742	19.240	8	51	0.001	0.742
Wilks Lambda	0.249	19.240	8	51	0.001	0.742
Hotelling's Trace	3.18	19.240	8	51	0.001	0.742
Roy's Largest Root	3.18	19.240	8	51	0.001	0.742

Table 3. Results of Multivariate Analysis of Variance (MANOVA) to compare the groups

	Variables	SS	Df	MS	F	Sig.
Model	Positive emotional memory	96.267	1	96.267	96.267	0.000
	Negative emotional memory	66.150	1	66.150	19.938	0.000
	Neutral emotional memory	24.067	1	24.067	5.467	0.023
	Concealing	268.817	1	268.817	17.055	0.000
	Adjusting	244.017	1	244.017	11.779	0.001
	Tolerating	268.817	1	268.817	47.988	0.000
	Anxiety sensitivity	173.750	1	173.750	0.768	0.384
Group	Positive emotional memory	96.267	1	96.267	34.438	0.000
	Negative emotional memory	66.150	1	66.150	19.938	0.000
	Neutral emotional memory	24.067	1	24.067	5.467	0.023
	Concealing	268.817	1	268.817	17.055	0.000
	Adjusting	244.017	1	244.017	11.778	0.001
	Tolerating	268.817	1	268.817	47.998	0.000
	Anxiety sensitivity	173.750	1	173.750	0.768	0.384
Error	Positive emotional memory	162.133	58	2.795	-	-
	Negative emotional memory	192.433	58	3.318	-	-
	Neutral emotional memory	255.333	58	4.402	-	-
	Concealing	914.167	58	15.761	-	-
	Adjusting	1201.633	58	20.718	-	-
	Tolerating	324.833	58	50.601	-	-
	Anxiety sensitivity	12784.833	58	239.221	-	-

Discussion

The present study was conducted to compare emotional memory, emotional styles, and anxiety sensitivity among people with substance use disorder and normal individuals. The results showed that there is a significant difference among the verbal emotional memory (positive, negative, and neutral) and the components of emotional styles in two groups of people with substance use disorder and normal people.

Based on the research findings, there is a significant difference between the emotional memory of people with substance use disorder and normal individuals; these results are consistent with the results of the studies conducted by Kelley (2004), and Scheier et al. (2001) which were based on the comparison of emotional memory, attention bias, and cognitive flexibility among people with substance abuse, smokers, and normal individuals. The amygdala appears to play the most important role in the interaction between emotion and memory. Neuronal mechanisms modulated by the amygdala increase memory about emotional stimuli especially during consolidation after emotional events. Substance use destroys the neural processes involved in the memory and learning. For instance, cocaine and heroin use can affect memory consolidation by affecting the amygdala area (Domínguez-Borràs et al., 2019; Herwig et al., 2019). In addition, impairment in the ability to form

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appropriate memory and perform adaptive learning tasks has been identified as a psycho-neurotic feature of addiction (Ferretti et al., 2019).

On the other hand, based on the findings of the research, the components of emotional styles are different among individuals with substance use disorder and normal individuals. In other words, the findings of the subcomponent of adjusting are consistent with the results of the study carried out by Sinha (2001) and the findings of the subcomponent of concealing are in line with the findings of the studies performed by Parker et al. (2001). Findings of the subcomponent of tolerating are consistent with the findings of studies done by Brown et al. (2002). In fact, the absence of adjusting the style of emotion is regulating when confronting stressful events and the low power of tolerance of ambiguity in these individuals can be considered as the causing factors of the start, continuation, and recurrence of addiction disorder. Regarding the explanation of findings, Blatt et al., (1984) claimed that people who have a low level of tolerance for ambiguity are unable to find suitable solutions due to defects in their cognitive cycle. As a result, they may use unadjusted strategies such as substance abuse. Emotional regulation is associated with greater mental ability to process social information. This ability can help people to better understand the negative and harmful consequences of drugs and to be more successful in coping with the psychological and social pressures of drug use. Therefore, the ability to regulate emotions can prevent substance use. On the other hand, substance use can also have negative effects on the ability to properly regulate emotions.

Finally, the findings of the present study do not confirm the hypothesis indicating that the anxiety sensitivity varies among people with substance use disorder and normal people, but the results of the study done by Taylor et al. (2007) and Taylor (2014) on comparing the regulation of emotion and anxiety sensitivity of people with substance use disorder and normal individuals indicated that people with substance use disorder have higher anxiety sensitivity compared to normal people. In fact, the function of anxiety sensitivity as anxiety enhancer causes the extreme and catastrophic perception of the addicted of a stressful situation, and when this situation is repeated, their cognitive system would be conditioned so that threatening signals will be automatically codified in initial stages as a priority. As a result, avoidance behaviors such as substance abuse are selected by them and emerged as a mechanism for adjusting and adapting to negative emotions. (Jafari et al., 2010; Karimi et al., 2010; Shaker et al., 2010; Heshmati & Ghorbani, 2016; Bayrami et al., 2011; Heshmati, 2016).

Conclusion

In sum, it can be concluded that emotional memory and emotional styles are two major determinants in substance use disorder. However, anxiety sensitivity has no role in substance use. Emotional memory and emotional styles can be influential factors in the tendency toward substance use. On the other hand, substance use can affect emotional memory and emotional styles through neural mechanisms. Therefore, it is suggested that training should be offered on emotion regulation and in negative events in memory of individuals with substance use disorder. Remembering and experiencing painful memories can have a positive effect on these people.

It should be noted that since the sample of the present study has been selected from the population of addicted men, its data cannot be generalized to addicted women. Moreover, considering the inability to control the type of substance used, the history of abuse, and rehabilitation of abusers, it is suggested that these variables get controlled in future studies so that the role of these factors will be clearly determined.

Conflict of Interests

The authors declare that there is no conflict of interests in this work.

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Authors' Contribution

Conceptualization, R.H.; Methodology, R.H. and M.S.; Formal Analysis, R.H; Investigation, M.S. and F.J.; Writing – Original Draft, R.H; Writing – Review & Editing, M.S. and F.J.

All authors read and approved the final manuscript and are responsible about any question related to article.

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