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Cognitive failures and metacognitive strategies of thought control in addicts and normal individuals

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ABSTRACT

The present study aimed to compare cognitive failures and metacognitive strategies of thought control in normal individuals and addicts. To this end, 244 patients including 122 patients referred to clinics for drug abuse treatment, as well as 122 matched normal individual as control group were selected through convenience sampling method. The subjects were interviewed and completed the Cognitive Failures Questionnaire (CFQ) and Metacognitive strategies of thought control Questionnaire (TCQ). Results of the statistical analysis (descriptive statistics, Independent t-test, MANOVA Regression analysis) showed that there were statistically significant differences between the components of the cognitive failures in addicts and normal individuals. Furthermore, the level of cognitive failures for addicts was higher than that of normal people. In addition, components of metacognitive strategies of thought control for addicts were less than those for normal individuals and this difference was significant. Moreover, metacognitive control strategies explained 14% of variance of cognitive failures of addicts. It seems that metacognitive strategies of thought control have a key role in orientation and continuation of addictive behaviors in addicts via accelerating cognitive failures.

Keywords: Addiction, Cognitive Failure, Metacognitive Strategies of Thought Control

INTRODUCTION

Addiction and drug abuse are the most striking mental-social issues that can easily undermine personal, familial, social and cultural lives of a country and jeopardize human dynamics. This as one of the pivotal issues in human life has taken into consideration from many various directions.

According to cognitive perspectives, addictive behaviors are influenced by people's beliefs and attitudes. Drug abuse creates rapid and meaningful changes in cognitive events, meaningful such as feelings, thoughts or memories (Marcantonio et al, 2012).

Based on the metacognitive theory, metacognitions are in charge of the healthy and unhealthy control of the mind. What determines the emotions and the ways they are controlled is not dependant to "what" of one's thoughts but rather how the person is thinking. Most cognitive activities are associated with metacognitive factors which regulate these activities. Moreover, data derived from the metacognitive monitoring are often experienced as influence behaviors that can affect the behavior (Wells and Davis, 2001).

Metacognition is a multifaceted concept of an individual's knowledge and beliefs (Wells, 2009); and is defined as any knowledge or cognitive process that contributes to appraisal, supervision or control of the cognition (Wells, 2004). This concept contains all cognitive information and some specific metacognitive areas associated with psychological disorders (Wells, 2005). The main idea is that metacognitive factors play a vital role in determining the maladaptive thinking styles in psychological disorders such as addiction, which leads to the continuation of negative emotions (Wells and Papageorgiou, 1995).

According to results of the conducted studies, metacognition plays a significant role in alcohol and drug addiction (Spada and Wells, 2005, 2006; Caselli, et al, 2010, 2012 & 2012). Metacognition is one of the most important factors in the development and maintenance of psychological disorders. Metacognition is impaired during drug abuse and may specifically be related to cognitive analysis of drug-dependent individuals.

Drug use may directly (e.g., creating comfort and avoidance, escaping from painful cognitions and creating awareness and attention) or indirectly (e.g., feelings of attachment, astonishment and repressed appraisals) affects cognitive events through changing beliefs and attitudes about avoiding cognitive events. Such cognitive changes may be the result of strong positive and negative reinforcement of drug use. Furthermore, the use of drugs not only brings about beliefs and expectations about the positive effects of the drug, but also leads to knowledge and awareness about the cognitive consequences (Holman, 2004).

Metacognitions affect emotional processing as well as the responses to trauma through the impact of metacognitive strategies on beliefs and interpretation of certain symptoms such as intrusive thoughts (Wells, 2000). The self-regulating executive performance model provides a detailed conceptualization of metacognitive factors as components of information processing. The main idea of this approach is that beliefs in metacognitive disorders are constituted of metacognitive components that guide and also have an impact on thinking activity and coping style. In this model, vulnerability to psychological disorders and its continuation are associated with cognitive and attention syndrome; however, the syndrome is characterized by intensified self-centered attention, threat review, ruminative processing, activating maladaptive/ incompatible opinions and dysfunctional self-regulating strategies (Wells, 2000). Overall it can be argued that beliefs about uncontrollability and danger is related to one's beliefs about the uncontrollability of thoughts and the fact that thoughts need to be controlled for a good performance and healthy living. Hence, the existence of such metacognitive beliefs makes people feel like they have less personal control, resulting in a lack of control, increased anxiety and depression. On the other hand, metacognitive beliefs about uncontrollability and danger makes people more skeptical of their ability and competence which have a negative impact on their mental health and increase the probability of starting substance use (Spada, Caselli & Wells, 2009).

Metacognitive thought control beliefs are also linked with cognitive failures. Cognitive failures are cognitive slips or errors that appear in one's memory, attention and action (Wallace, 2003). Among the components of metacognitive thought control, positive beliefs about worry, cognitive confidence and negative beliefs about the uncontrollability of thoughts are related with cognitive failures. In studies carried out on drug abuse and addiction, both components of metacognition and cognitive failures have been considered (Mecacci, et al, 2006; Mecacci, 2005).

Coreman, Faravan, Toomey, Sideman and Tsuang (1998) and Van, Van, Bruce, Boutrose and Crawford (2008) found a correlation between high levels of worry and dysfunctional metacognitive beliefs and cognitive failures and that these interacting factors are involved in drug dependence. Identifying the differences of cognitive failures and metacognitive control beliefs in between addicts and normal individuals can increase therapists' motivation and knowledge to adopt cognitive and metacognitive approaches for addiction therapy.

Since the majority of studies conducted in this area of research were examples of alcohol abuse in Western countries and given the fact that addiction and the dominant culture of drug abuse in Iran are mostly related to drugs and stimulants; hence, there is a great need for further research in this field. Accordingly, the present study aims at comparing cognitive failures and metacognitive strategies of thought control in normal individuals and addicts.

MATERIALS AND METHODS

The current study is a correlational one.

Population, sample and sampling method

Two groups of people including drug addicts and normal individuals participated in the study. The population of the study involved all drug addicts who referred to treatment centers as well as normal individuals in Mashhad.

Overall, four clinics in Mashhad, receiving 200 patients monthly, were selected. According to Morgan charts, among patients referred to these clinics, 122 patients were selected through convenience sampling method and were compared with 122 non-addict (normal) individuals who accompanied these addicts and matched to addicts group in terms of personal-social characteristics (age and education level).

Cognitive Failures Questionnaire (CFQ). Cognitive Failures questionnaire was designed by Broadbent, Cooper, Fitzgerald and Parkes in 1982. This scale has 24 items answered based on a five-point Likert scale (from "never" to "always"). It has four components that include distractibility, deficit in memory, oversights and lack of nominal/name recall. Wallace (2004) reported that the coefficient alpha of this questionnaire is 0.96 and its reliability is 0.51.

Metacognitive strategies of thought control questionnaire (TCQ). The questionnaire was developed by Wells and Davis in 1994 to assess individual differences in the use of desirable and intrusive thought control strategies and has five scales as follow: distraction, social control, worry, punishment and reappraisal. The Cronbach's Alpha of the questionnaire's subscales varied from 0.64 to 0.79. Test-retest correlations at an interval of 6 weeks were as follows: distraction (0.72), social control (0.79), worry (0.71), punishment (0.64) and reappraisal (0.67). This is while the Cronbach's alpha for the whole questionnaire was 0.83 (Wells & Davis, 1994).

Methodology and Ethical Issues

To collect data and perform the research, which lasted for 2 months, the subjects were selected among those who were eager to participate in the study and had the required criteria for participation. These criteria for addicts were having at least secondary school education or higher, and having full criteria for drug dependency according to the Diagnostic and Statistical Manual of Mental Disorders of American Psychiatric Association, DSM-IV. However, no kind of drug usage was regarded as a criterion for healthy participants who often companied the patients and were identified based on interviews by a psychologist in 4 considered clinics for drug abuse treatment. Afterwards, the subjects were asked to complete some questionnaires (cognitive failures questionnaire and metacognitive strategies of thought control). The questionnaires were completed individually, since the group completion was not possible.

Methods of data analysis

In this study, descriptive statistics including mean, standard deviation, inferential statistics, independent t-test, MANOVA and regression analysis were applied.

RESULTS

Two groups (drug addicts and non-addicts) including 244 respondents participated in the study. Among the participants, 122 respondents (50%) were addicts and 122 respondents (50%) were normal individuals. In this study, 49 addict respondents and 15 normal respondents were under diploma and 73 addict respondents and 107 normal respondents had diploma and higher levels of education. In terms of marital status, 76 addicts and 65 normal respondents were single and 46 addicts and 57 normal respondents were married. In terms of age, 244 addicts and normal respondents (100%) were under 30 years of age.

Demographic features of respondents (two groups of addicts and non-addicts), age, marital status, and education are depicted in Table 1.

Table 1: Demographic features of respondents based on age, marital status, and level of education

groups	frequency	Education		Age		Marital status	
		under Diploma	Diploma and higher	Under 30 years	Over 30 years	Single	Married
Addict	122	49	73	122	0	76	46
Non-addict	122	15	107	122	0	65	57
Total	244	64	180	244	0	141	10

In the following, mean and standard deviation of the subscales of metacognitive strategies of thought control and cognitive failures between addict and normal groups are shown in Table 2.

As can be seen in Table 2, the highest mean among the subscales of metacognitive strategies of thought control for normal respondents is related to the distraction subscale score with a mean of 15.32, and the standard deviation of 3.11. The second place is for cognitive failures with a mean of 22.13 and standard deviation of 6.43. For the addicts group, the highest mean among the scales of metacognitive strategies of thought control is related to punishment subscale with a mean of 17.2 and the standard deviation of 4.1. The second highest mean for this group is for

cognitive failure with a mean of 42.47 and the standard deviation of 11.73. To compare the components of metacognitive strategies of thought control of addicts with normal individuals, MANOVA was used. The results are presented in Table 3.

Table 2: Mean and standard deviation of the subscales of metacognitive strategies of thought control and cognitive failure between addict and normal groups (n = 244)

Distraction	Normal	15.32	3.11
	Addict	7.7	1.3
Punishment	Normal	6.44	4.34
	Addict	17.2	4.1
Reappraisal	Normal	14.33	3.7
	Addict	6.9	3.04
Worry	Normal	9.14	3.13
	Addict	15.8	1.9
Social Control	Normal	13.32	3.6
	Addict	6.5	3.6
Cognitive failure	Normal	22.13	6.43
	Addict	42.47	11.73

Table 3 - Results of MANOVA, Normalized difference between the two groups in metacognitive strategies of thought control

Index	Sum of squares	Degree of freedom	Mean square	F	Significance	Test power
Distraction	76.1	1	76.1	51.22	0.01	100
Punishment	89.91	1	89.91	31.02	0.01	100
Reappraisal	41.25	1	41.25	36.14	0.01	100
Worry	31.44	1	31.44	61.16	0.01	63
Social Control	61.31	1	61.31	18.2	0.01	81

According to Table 3, there is a statistically significant difference between the two groups in cognitive subscales of metacognitive strategies of thought control ($P < 0.001$).

Table 4: Comparison of respondents in terms of the subscales of the metacognitive strategies of thought control questionnaire (TCQ) between the two groups of addicts and non-addicts (N=244)

Index	Group	mean	Standard deviation	Degree of freedom	T	Significance
Distraction	Addict	7.7	1.3	240	7.2	0.001
	Normal	15.33	3.11			
Punishment	Addict	17.2	4.1	240	10.12	0.001
	Normal	6.44	4.34			
Appraisal	Addict	6.9	3.04	240	8.18	0.001
	Normal	14.33	3.7			
Worry	Addict	15.8	1.9	240	6	0.001
	Normal	9.4	3.13			
Social Control	Addict	6.5	3.6	240	14.13	0.001
	Normal	13.3	3.6			

Results of table 4 showed that there is a statistically significant difference ($P < 0.001$) between addicts and normal individuals in terms of the five subscales including distraction, punishment, reappraisal, social control, worry and social control, so that for addicts, the highest mean is related to punishment ($M=17.24$, $SD=4.1$) and the lowest mean is for social control ($M=6.5$, $SD=3.6$). The highest mean for normal individuals is related to distraction ($M=15.32$, $SD=3.11$) and the lowest mean is for punishment ($M=6.44$, $SD=4.3$).

To compare cognitive failures between addicts and non-addicts, independent t-test was applied. The results are presented in Table 5.

Table 5: Comparison of respondents according to Cognitive Failures Questionnaire (CFQ) (N=244)

index	Group	mean	Standard deviation	Degree of freedom	T	Significance
Cognitive failures	Addict	42.47	11.73	240	16.01	0.001
	Normal	22.13	6.43			

As shown in Table 5, there is a statistically significant difference between the two groups of addicts and normal individuals in cognitive failure variable ($P < 0.01$); such that, the total score of cognitive failures for addicts is higher than that for non-addicts.

To compare the components of cognitive failures between addicts and non-addicts, MANOVA was used. The results are presented in Table 6.

Table 6 - Results of multivariate analysis of variance (MANOVA) between the two groups of addicts and normal individuals in Cognitive Failures

Index	Sum of square	Degree of freedom	Mean square	F	Significance	Test power
Distraction	67.6	1	67.6	23.26	0.001	100
Deficit in memory	75.62	1	75.62	33.51	0.001	100
Lack of nominal recall	55.22	1	55.22	5.57	0.001	100

Table 6 depicts the difference between the two groups in MANOVA test in terms of subscales of cognitive failures. Based on these results, there is a statistically significant difference between the two groups in the subscales of cognitive failures (distractibility, deficit in memory and lack of nominal recall ($P < 0/01$). Addicts had higher cognitive failures.

Table 7: Summary of the regression model and statistical parameters of the regression of metacognitive strategies of thought control and on addicts' cognitive failures

Predictor variables	Coefficient B	Coefficient Beta	t Ratio	Significance	R	R ²	The standard error of measurement
Punishment	0.29	0.23	4.2	0.001	0.33	0.09	4.6
Worry	0.23	0.18	2.3	0.001	0.27	0.14	4.2

The results of regression analysis in Table 7 indicated that among the component of metacognitive strategies of thought control, subscales of punishment and worry are significantly associated with cognitive failure and are strongest predictors of cognitive failure of addict ($R=0.29$, $P < 0/01$). Overall, these variables predict 14% of the cognitive failures symptoms of addicts ($R^2 = 0.014$).

DISCUSSION AND CONCLUSION

This study was conducted to compare cognitive failures and metacognitive strategies of thought control in normal individuals and addicts.

The results showed that the components of metacognitive strategies of thought control in addicts were less than those in normal individuals. The significance of the difference was that among addicts the highest mean was related to punishment and the lowest mean was associated to social control, which suggests the weakness of addicts in terms of social control and the power of self-punishing thoughts of addicts. Among the normal individuals, the highest and the lowest means were related to distraction and punishment, respectively. This result reveals the significant role of punishment in individuals' worry and makes them unhealthy. Since patients have problems with distraction, they may have troubles with processing the information of daily experiences. Addicts use punishment signs/symptoms because their vulnerability. In general, weakness in distraction increases the punishment in addicts. The results of the present research are consistent with the findings of wells and Mathews (2000) about metacognitive deficit in addicts comparing to normal individuals. Negative metacognitive strategies of thought control are beliefs about uncontrollability, meaning, importance and danger of thoughts and cognitive experiences in all of which addicts have problems. On the other hand, metacognitive strategies of thought control have an important role in alcohol and drug addiction (Spada and Wells, 2005, 2006). According to recent theories, metacognitive strategies are important factors in the development and maintenance of psychological disorders, which are impaired during drug abuse and may specifically be related to cognitive analysis of drug-dependent individuals. From the metacognitive perspective, drug abuse creates rapid and meaningful changes in cognitive events; meaningful such as feelings, thoughts or memories that would affect one's whole life so that self-adaptive metacognitive beliefs may cause irreparable impairments in one's personal, professional and educational life as seen in drug-dependent individuals which was proved in this research.

In addition, the components of the cognitive failures in addicts and normal individuals were significantly different. These results indicated that cognitive failures in addicted individuals and behaviors in which cognitive actions are more involved.

The results are consistent with similar studies such as Wallace et al. (2002) who examined the cognitive failures in patients with psychiatric disorders associated with psychiatric and psychotropic drugs.

The results demonstrated that compared to other patients with similar disorders, these patients were more vulnerable in cognition and memory. The study is also aligned with Vabcrak and Saltouos (2000), which examined the cognitive failures in patients with anxiety disorders. The results revealed that these patients experienced more cognitive failures than normal individuals. The results of the study are also consistent with Mecacci (2005) and Mecacci et al (2006) about the difference between cognitive failures in men with and without alcohol use. The results of these research studies showed that because of the effects of anxiety, stress and irrational cognitions, addicts experience more cognitive failures than those who experience less stressful situations.

As observed from the findings of this study, normal individuals had reported slight cognitive failures and experienced more ideal conditions compared to addicts. Since cognitive failure is a multi-dimensional construct that includes errors to form objectives, errors to activate schemas and error to setup actions, these signs are frequently seen in addicts' behaviors. In addition, the results of the present research are consistent with Dorne et al (2010). When such errors occur in action setup, they may entail serious damage or even death for addicts due to cognitive weakness.

Since addicts had high scores in uncontrollability and danger, this makes them engage in maladaptive coping strategies (avoidance, thought suppression, etc) and applying these strategies makes concepts of threat available to process and intensify stress and negative emotions. In fact, these processes cause individuals to overestimate environmental threats and underestimate their ability to cope these lead to the tendency to addiction and continuity of psychological diseases.

Moreover, addicts appear to have certain styles of rigid and repetitive thinking to respond to negative thoughts, feelings and beliefs, seen in addicts. Therefore, therapeutic approaches should focus on changing such useless processing styles. In addition, worry in addicts declines to the lowest level. The lack of correct experience of being punished of daily events makes addicts fail to acquire proper cognitive and metacognitive beliefs with which their own as well as their therapists' awareness is essential.

Due to limitations of samples and population, interpreting and generalizing the findings to other groups were among the limitations of the study. Lack of addicts' adequate cooperation and their irritability during performing the test, which occurred due to their low threshold of tolerance and in addition, uncertainty toward honesty during answering the questionnaires were other limitations of this study. Future studies are proposed to be conducted using therapeutic approaches that are based on cognitive failures and metacognitive strategies of thought control. Such projects may also adopt intervening methods and impose more strong control over confounding variables.

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