

Abstract

Objective: The aim of this study was to predict cognitive flexibility based on meta-worry, anxiety, duration and dose of methadone use. **Method:** The current research was a descriptive-correlational one. The statistical population of this study included all male drug-dependents who were under methadone treatment in Qazvin in 2016. From among this population, 254 participants were selected via purposive sampling method and completed Wells's Meta-Worry Questionnaire (2005), Beck Anxiety Inventory (1988), and Dennis and Vander Wal's Cognitive Flexibility Inventory (2010). **Results:** The results of step-wise multivariate regression method showed that meta-worry and anxiety significantly predicted cognitive flexibility in men under methadone treatment ($p < 0.05$). Also, duration and dose of methadone could not predict cognitive flexibility ($p > 0.05$). **Conclusion:** It can be concluded that meta-worry and anxiety have a negative significant correlation with cognitive flexibility. In this way, the high levels of meta-worry anxiety lead to low cognitive flexibility. Therefore, it is necessary to focus on metacognitive components for achieving high cognitive flexibility; in addition drug addicts under methadone maintenance treatment are recommended to use metacognitive therapy.

Keywords: methadone maintenance treatment, anxiety, meta-worry, cognitive flexibility

Prediction of Cognitive Flexibility in Methadone-Treated Patients based on Meta-Worry, Anxiety, and Duration and Amount of Methadone Use

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Introduction

Addiction is a phenomenon that has gradually penetrated human societies over the past six thousand years. Drug addiction is recognized as one of the health, psychological and social problems of the present century (Momeni, Mushtaq and Abbaspour, 2010). Today, addiction has destroyed a wide range of people in the world and infected many families with bad consequences and endangered communities' security (Chassin, Presson, Rose, & Sherman, 2007). With regard to the prevalence of substance abuse in the American society, about 15% of the population over the age of 18 has serious drug abuse-related issues (Saduk, Saduk & Ruiz 2015). The ratio of drug use among men and women is 2 to 1 (Peter and Alicia, 2010). In Iran, over the past 20 years, the growth rate of substance abuse has reached more than three times of population growth rate (Tavakoli Ghoochani, Shojaeezadeh and Mazlum, 2009). Control of opiate dependence is of great importance for our country. The phenomenon of substance abuse has many implications for research in many areas of clinical psychiatry and society in general. One of its consequences is the development of Neuro-Psychiatric Symptoms that are inseparable from symptoms of common psychiatric disorders without a clean cause (such as schizophrenia and mood disorders). This observation can be interpreted to mean that mental disorders and disorders related to the substances use affecting the brain are interrelated. Antisocial personality disorder, panic and other anxiety disorders, depression disorders and psychiatric disorders are the most common psychiatric diagnoses that are commonly associated with substance abuse. Substance abuse is one of the most important health, social and economic problems in many countries. Researches have shown that drug addiction is multidimensional or multifactorial, and various psychological, social, cultural, individual and genetic factors are involved in this regard (Saduck et al., 2015). In the past years, there have been many measurements to treat addiction, but unfortunately, despite many efforts, the statistics of slip and abandoning treatment are high in individuals with substance dependence receiving treatment. The unsuccessful withdrawals and frequent relapses in drug-dependent individuals represent incomplete and mono-dimensional treatment in these individuals. Depending only on physical abstinence and not paying attention to personal, psychological, personality and environmental factors can create problems, as personality factors and individual weaknesses remain unresolved and the problems of substance-dependence time such as escape from people, being excluded from the society and individual shortcomings are added and this leads to the isolation of the individual under the treatment, and this feeling may cause the person return to drug use (Litri, 2004, Translated by Rezayi and Zakariayi, 2005).

Methadone treatment is one of a number of treatments that are advised to help patients and reduce their health and social problems (Farhadinasab and Kashani, 2008). Methadone is an industrial substance that has similar physiological and

analgesic properties to opium, but it is not ecstatic (Barnett, 2009). Methadone is a long acting agonist with a half-life of about 24 to 36 hours. One of the most effective drugs for addicts' heroin withdrawal is methadone (Lones, et al., 2017). Methadone has a number of consequences and complications such as physical, psychological, familial, and social and other complications like other opioids, one of its complications is physiological dependence (Nickbakht, 2014). Methadone complications are similar to those of other opioids; methadone has a negative effect on information processing, memory, and executive functions (Dark, Sims, Mc Donald & Wickes, 2000). Methadone maintenance is reported to be between 30% and 70% after one year. The dose of methadone use and age has been one of the most important determinants of continuance (Zhou, & Zhang, 2014). Also, Methadone use can also be associated with cognitive and psychological components such as Meta-worry, cognitive flexibility, and anxiety. Worry includes catastrophizing and its mental control is difficult. The process of worry is considered as a coping mechanism, but the very process itself can be a concern focus (Borkovec & Romer, 1995). When a normal worry becomes a pathologic worry, meta-worry is created. In other words, being worried about worry is called meta-worry. Worry not only as a anxiety-induced symptom, but also as a motivational and active style is of great importance for assessing and coping with fear, and it seems that people with anxiety disorder use worry to cope up with the risk or predicted fear. Although, meta-worry leads to increased anxiety, because an individual conceives the need for concern as a kind of coping, he does not care about breaking the worry chain (Wells, 2000). Worry is usually activated as a coping strategy in response to intrusive thoughts. When negative beliefs are activated, one evaluates thinking about concerns as a negative action, it means that he will be worried about worry and this increases anxiety and inability to cope (Beigi, Shirazi and Pasandideh, 2012).

Indeed, the results of various researches show that people with anxiety disorders have strong worrying beliefs than healthy people (Wells and Carter, 2001, Rascio and Borkowick, 2004, Wells, 2000). Stress and anxiety have a significant relationship with substance dependence and individuals with high stress and anxiety disorders are more susceptible to substance abuse (Fosnocht, & Briand, 2016; Sims, 2008). It has been observed that people who use methadone experience a lot of anxiety (Peles, Schreiber, & Adelson, 2009). Having a history of anxiety disorders and early onset of drug use is one of the predictors of the effectiveness of methadone maintenance treatment (Karsinti et al., 2016). Also, methadone maintenance treatment has not been shown to have a positive effect on cognitive functions such as attention, memory and flexibility (Copenhaver, et al., 2016 and Nejati, 2015). Although methadone maintenance treatment creates a sense of integrity and meaning of life, it did not have a significant effect on improving the emotional regulation (Nalaskowska, & Cierpiałkowska, 2014). There is no consensus on the definition of the concept of "cognitive flexibility". Generally, cognitive flexibility is the ability to change

cognitive approaches in order to adapt to changing environmental stimuli (Denis & Vender, 2010). Some researchers have defined cognitive flexibility as one's assessment of the controlling of the conditions as this assessment varies in different situations and is impaired in people with depression and cognitive flexibility anxiety (Zong, et al., 2010; Gan, Liu, & Zhang, 2004). In this regard, Von Geusau et al. (2004) and Reneman et al. (2001) have shown in separate studies that cognitive flexibility is impaired in substance abusers, and it increases the perseveration behaviors and attention deficit in them (Salo, Gabay, Fassbender, & Henik, 2011). In their research, Kalechstein, Newton, & Green (2003) and Lundqvist (2005) compared the morphine quitters, people receiving methadone maintenance treatment and normal subjects and found that the methadone recipient group showed considerable cognitive function disorder and the first and third groups were in the next ranks. Therefore, based on the increasing number of drug quitting with methadone maintenance treatment in the country, considering the possible physical, psychological and cognitive side effects of methadone, especially in cognitive areas and reducing its side-effects, the present study attempts to answer this question "Do anxiety, meta-worry, duration and amount of methadone use predict the cognitive flexibility of methadone treated people?"

Methodology

Population, sample and sampling method

The current research was a descriptive-correlational one. The statistical population of this study included all male drug-dependents (300) who were under methadone treatment in Qazvin in 2016 and they were selected for the study.

Of 300 executed questionnaires, 254 were completed fully and 46 questionnaires were excluded due to its incompleteness by the sample group. Finally, 254 people were selected via purposive sampling method based on the methadone treatment as the sample study. The inclusion criteria were satisfaction and willingness to do research, methadone consumption, male gender, ability to read and write, and exclusion criteria include drug use and consumption of any drug other than methadone.

Instrument

1-Meta-Worry Questionnaire: The questionnaire is designed by Adrian Wells (2005) to assess the danger aspect of meta-worry and the frequency and the amount of beliefs in meta-worry. This questionnaire was developed to evaluate the meta-cognitive model of Generalized Anxiety Disorder. The scale includes seven items that are related to the risk of worry. The Cronbach's alpha coefficient of the subscales of meta-worry frequency is 0.88 and the subscale of belief in meta-worry is reported to be 0.95. The meta-worry questionnaire has a significant relationship with other meta-cognitive scales. This questionnaire, in particular,

has a strong positive correlation with negative beliefs about worry than positive beliefs about worry measured by meta-cognitive questionnaires.

In terms of construct validity, meta-worry questionnaire can distinguish outpatient patients with generalized anxiety disorder criteria from those with physical anxiety or without it (Wells, 2005). The reliability of the meta-worry questionnaire in Iran has been reported by Salmani, Hassani, Mohammad Khani and Karami (2014) as 0.71. In the present study, the reliability of Cronbach's alpha was 0.74.

2- Beck Anxiety Inventory: This 21-item questionnaire was developed by Beck et al. (1988) to assess the severity of anxiety symptoms. Each of its items describes one of the common symptoms of anxiety (mental symptoms and panic) and is scored 0 to 3, and the maximum score being obtained is 63 which indicate severe anxiety. The coefficient of internal consistency (alpha coefficient) is 0.92, and the reliability of the test of 0.75 per week and the correlation of its terms is reported from 0.30 to 0.76 (Beck, Epstein, Brown, & Steer, 1988). In Iran, the reliability of this questionnaire on 1513 men and women from Tehran showed that internal consistency with Cronbach's alpha coefficient was 0.92 (Kaviani and Mousavi, 2008). The reliability of Beck Anxiety Inventory based on Cronbach's alpha was obtained 0.86 in the present study.

3- Cognitive Flexibility Inventory (CFI): This questionnaire was developed by Dennis & Vander (2010) and it is a self-report instrument with 20 questions. This inventory is used to measure a kind of cognitive flexibility that is needed for a person's success in challenging and replacing inefficient thoughts with more efficient thoughts. The scoring is based on a 7-point Likert scale and seeks to measure three aspects of cognitive flexibility: (a) the tendency to perceive difficult situations as controllable; (b) the ability to perceive multiple alternative explanations for life occurrences and human behavior; and (c) the ability to generate multiple alternative solutions to difficult situations. This questionnaire is used in clinical and non-clinical work and to assess the degree of individual progress in creating flexible thinking in the cognitive-behavioral therapy of depression and other mental diseases (Dennis & Vander, 2010). Dennis & Vander (2010) in a research showed that this questionnaire has suitable factor structure, convergent validity and concurrent validity.

These researchers showed that the two factors of perceiving different alternatives and perceiving the justification of behavior had the same meaning and the control factor was considered as the second component. The concurrent validity of this questionnaire with the Beck Depression Inventory was 0.39 and its convergent validity with the cognitive flexibility scale of Martin and Robin was 0.75. The researchers obtained the reliability of Cronbach's alpha for the whole scale, controllability perception, and perception of various alternatives of 0.91, 0.91 and 0.84, respectively, and by test re-test method, as 0.81, 0.75 and 0.77, respectively. In Iran, Shareh, Farmani and Soltani reported the reliability coefficient of test re-test of total score as 0.71 and the subscales of controllability

perception, perception of different alternative and perception of behavior justification as 0.55, 0.72, and 0.57, respectively (Quoted from Sultani, Shareh, Bahrainian and Farmani, 2013). The researchers reported the Cronbach's alpha coefficients of total scale to be 0.90 and for the subscales 0.87, 0.89 and 0.55, respectively. This scale also has a good factor, convergent and concurrent validity in Iran. Its convergent validity with Conner and Davidson's resilience scale was obtained 0.67 and its concurrent validity with Beck Depression Questionnaire as -0.50 (Soltani et al., 2013). In the present study, the reliability of cognitive flexibility questionnaire for the total scale was obtained 0.76.

Findings

The descriptive statistics of the studied variables are presented in Table 1.

Table 1: Descriptive Statistics of the Studied Variables

<i>Variables</i>	<i>F</i>	<i>Mean</i>	<i>SD</i>	<i>Minimum score</i>	<i>Maximum score</i>
The amount of methadone use	249	20/50	15/16	2	100
The annual methadone use duration	249	3/93	2/70	1	20
Cognitive flexibility	249	85/43	15/34	44	130
Anxiety	249	39/59	16/38	21	80
Meta-worry	249	15/42	14/7	7	57

The correlation matrix of the studied variables is shown in Table 2.

Table 2: Correlation Matrix of Cognitive Flexibility, Anxiety, Meta-worry, the Amount and Duration of Methadone Use

<i>Variables</i>	<i>1</i>	<i>2</i>	<i>3</i>	<i>4</i>
1-Flexibility	-	-	-	-
2-Anxiety	-0/14*	-	-	-
3-Meta-worry	-0/24**	0/64**	-	-
4-The amount of use	0/09	-0/03	-0/04	-
5-Consumption duration	-0/04	0/06	0/01	0/15*

*P< 0/05, **P<0/01

To predict cognitive flexibility based on meta-worry, anxiety, the amount and duration of methadone use among methadone users, multivariate stepwise regression analysis was used. Before implementation regression, the assumptions of regression were performed. Table 3 indicates the results of the Leven's test and Kolmogrov-Smirnov tests to examine the equality of error variances and the normality of data distribution.

Table 3: The results of Equality Assumptions of Error Variances and the Normality of Distribution

<i>Variables</i>	<i>Leven's test</i>		<i>Variables</i>	<i>Kolmogorov-Smirnov</i>	
	<i>F statistics</i>	<i>Significance</i>		<i>Z statistics</i>	<i>Significance</i>
Cognitive flexibility	1/32	0/07	Cognitive flexibility	0/036	0/21
Anxiety	1/88	0/09	Anxiety	29/1	0/056
Meta-worry	1/91	0/54	Meta-worry	1/72	0/061
The amount of methadone use	0/32	0/89	The amount of methadone use	1/18	0/070
Methadone use duration	0/76	0/57	Methadone use duration	1/11	0/073

As can be seen in the above table, both assumptions, the equality of error variances and normal distribution are satisfied. A summary of the regression analysis based on the predictor variables is shown in Table 4.

Table 4: A Stepwise Regression Analysis for Prediction of Cognitive Flexibility Based on Meta-Worry, Anxiety, Amount and Duration of Methadone Use

<i>Criterion variable</i>	<i>Predictive variables</i>	<i>β Standardized coefficients</i>	<i>T statistics</i>	<i>R²</i>	<i>F statistics</i>
Flexibility	Meta-worry	-0/24	-3/96**	0/25	15/66**
	Anxiety	-0/15	-2/31*	0/39	5/32*

*P < 0/05, **p < 0/01

As shown in Table 4, among the predictive variables of the cognitive flexibility, variables of meta-worry and anxiety could significantly predict the cognitive flexibility. The results of regression analysis show that in the first step, meta-worry and in the second step, anxiety in total with significant variance (approximately 39%) could predict the cognitive flexibility of individuals under methadone treatment. The amount and duration of methadone use was not a significant predictor of cognitive flexibility and were eliminated from the regression equation because of insignificance.

Discussion and Conclusion

The use of addictive substances and its dependence is a chronic and recurrent phenomenon that has serious physical, financial, family and social harm. A few phenomena can be found that, like addiction, have threatened human societies. Despite the dangers and complications of addiction, every day the victims of this fatal trap are increased (Salemink, Van Lier, Meeus, Raaijmakers, & Wiers, 2015). Now, most of drug dependence specialists and practitioners believe that drug dependence is a psychological, genetic, physical and social disorder, based on which a variety of drug and psychological treatments and social interventions is designed to control it. The important point is that a substance-dependent person is guided to appropriate therapy plan based on his conditions (Naderi, Binazadeh, Safatian and Peivandi, 2008). Drug use disorder is one of the factors that directly and indirectly disrupts the order and security of the society and has personal and social impacts on the legal, social, biological and financial fields

both in personal and social terms. In addition to millions of people who suffer from this social problem in the world, its effects and outcomes also affect the lives of millions of people indirectly (Kamarzarin, Zare and Brookimilan, 2012).

The aim of this study was to predict cognitive flexibility based on meta-worry, anxiety, duration and dose of methadone use. The results of statistical analysis and the findings showed that the hypothesis of predicting cognitive flexibility based on meta-worry and anxiety was significant at the level 95%. The results of correlation coefficients showed that there is a negative and inverse relation between cognitive flexibility and meta-worry at the level 99% and a significant relationship between cognitive flexibility and anxiety at the level 95%. Based on the results of stepwise regression analysis, the variables of meta-worry and anxiety in total with the significant variance of approximately 39%, could explain and predict the cognitive flexibility of individuals under methadone treatment. That is, the higher the amount of meta-worry and anxiety in people under methadone treatment, the lower their cognitive flexibility. The results of this study are consistent with the results of Zong et al. (2010). Cognitive flexibility can be predictable by meta-worry and anxiety variables among the individuals under treatment and the amount of meta-worry and anxiety among the individuals under treatment can be effective on their cognitive flexibility. The amount and duration of methadone use did not predict cognitive flexibility. Statistical findings did not show a significant relationship between cognitive flexibility and the amount and duration of methadone use, meaning that there is no correlation between the high and low methadone use and the short and long term duration of methadone use with cognitive flexibility and it is not possible to predict the cognitive flexibility of people undergoing methadone based on the amount and duration of methadone use. No research was found to directly compare the results of this study with it in this section. Cognitive flexibility is the ability to change cognitive approaches in order to adapt to changing environmental stimuli (Denis & Vander, 2010). Cognitive flexibility is an individual's evaluation against being controlled by the environment and this assessment is changing in different situations and this cognitive ability to adapt to new conditions, such methadone –based drugs quit in an ever changing environment of a person can be useful. In fact, anxiety and consequently, meta-worry as an effective cognitive component in anxiety disrupts the function of cognitive flexibility that is useful for adapting to new conditions.

In the field of flexibility, it can be said that the flexibility of individuals in the incidence of injuries and their level of performance is very important. Given that meta-worry and anxiety are predictive of cognitive flexibility. Achieving of cognitive flexibility in individuals who are under methadone maintenance treatment, can be lead to more adaptation with new living conditions and can be lead to increase the life quality and reduction of anxiety and meta-worry as a cognitive part of anxiety and worry. Therefore, considering the meta-worry treatment based on meta-cognitive therapy (Wells, 2001) is necessary because

the interventions lead to a reduction in anxiety and meta-worry in the individuals under treatment, which in turn increases the amount of cognitive flexibility and leads to the immediate improvement of people being treated. Regarding the findings, it seems that in the methadone maintenance treatment, not only the physical components must be considered, since this treatment can reduce the cognitive functions due to anxiety and meta-worry, paying attention to effective psychological components such as meta-worry and anxiety is important for achieving cognitive flexibility. Because as long as the people undergoing treatment have a high degree of anxiety and meta-worry that leads to low levels of cognitive flexibility, they will not have the appropriate cognitive and emotional regulation to abandon and adapt to new conditions, which will lead to re-slip or reducing the effectiveness of methadone-based treatment. The limitations of this research are related to the lack of proper collaboration between some methadone-treated people and another one is the selection of sample groups among men and the absence of women in the research. For future researches, it is suggested that other roles of cognitive factors such as memory, perception and attention, mindfulness and psychological factors such as self-esteem and attachment styles in methadone-treated individuals for more effective treatment and relapse prevention should be taken into consideration. Therefore, it is suggested that attention be paid to methadone maintenance treatment in combination with psychological treatments of anxiety and meta-worry and the effectiveness of metacognitive therapy along with methadone treatment should be investigated.

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