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ABSTRACTED/ INDEXED IN:  
The Role of Impulsivity, Risk-Taking, and Sensation-Seeking in People Prone to Substance Abuse

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Received: 14 Jan, 2014
Accepted: 21 Feb, 2014

Abstract

Abuse and dependency have always been a social, cultural, and economic problem, especially in our society. Studies have demonstrated that some of cognitive sub-structures such as risk-taking, sensation-seeking, and impulsivity are related to addiction formation and some other anti-social behaviors. The purpose of this study was to examine these traits of personality among individuals prone to substance abuse and also to compare them with control groups in terms of these attributes. The questionnaires were used to collect data which then was analyzed using SPSS for independent t-test. Based on findings of this study people prone to addiction are at a higher level compared with the control group in terms of impulsivity, risk-taking and sensation-seeking. While impulsivity and risk-taking were significantly different between individuals prone to addiction and normal subjects, no significant difference was found among them in term of sensation-seeking.

Keywords: drug abuse, dependency, impulsivity, risk-taking, sensation-seeking, personality traits

Introduction

Abuse and dependency have always been a social, cultural and economic problem (UNDCP, 1995), especially in our society. This phenomenon has been analyzed from different perspectives: genetics, biology, sociology, psychology, and criminology. It seems that some of cognitive sub-structures such as risk-taking, venturesomeness, sensation-seeking, impulsivity, reward-seeking, and flight injury are related to addiction formation and some other anti-social behaviors. Impaired decision-making, is the core of the addiction formation. The high risk of the HIV/AIDS prevalence, social problems related to substance
abuse such as relationships and marriage breakdown, unemployment, homelessness, and neglect of children, may lead to the child's need to be placed into the foster care system. Besides, there is a significant correlation between illegal drugs, and criminality (National Institute for Health and Clinical Excellence, 2007). Considering the role of cognitive substructures in this phenomenon, and also the importance of prophylactic pre-exposure can be effective in treatment and prevention plan; thus, it is necessary to study and compare the impulsive behaviors and decision-making disorders in people prone to substance abuse (Mintzer & Stitzer, 2002). In the context of substance dependency, different psychological factors including social, family, and biology contribute to dependency. But none of them can be a determinant of the substance abuse solely (Franques, Auriacombe and Tignol, 2000). These factors determine when a person starts using substance and why. Substance use can quickly change to substance abuse (frequent use despite of negative consequences) and then to dependency (drug tolerance, withdrawal symptoms and compulsive drug-taking), (National Institute for Health and Clinical Excellence, 2007). Effective health interventions seek to reduce risk factors and / or improving the protective factors of health-threatening behaviors. Hence, prevention and treatment programs for substance abuse are generally based on known risk factors and protective factors of drug abuse. There are many studies on risk factors for drug use and abuse but still exists a large discrepancy between these studies (Spooner, 1999).

The researches done about drug abuse show that drug users have neuropsychological defects (Basso & Bornstein, 2003, Hardy & Hinkin, 2002; Rogers & Robbins, 2001; Verdeg Garcia 2004) and this can impact their everyday appropriate functioning (Benedict, 2000; Heaton, 1994-2004). Recent findings indicate that there are behavioral and cognitive abnormalities in drug users (Basso & Bornstein, 2003; Hinkin, 2004; Martin, 2004 Nath, 2002; Rippeth, 2004). These abnormalities generally appear on the neuropsychological functioning and personality disorders of these individuals. These defects include problems with learning and remembering information, slow information processing and disabilities in executive function (Hardy & Hinkin 2002; Rogers & Robbins, 2001; Verdeg Garcia 2004). Results of studies which examine various aspects of drug users’ executive functioning suggest that there are abnormalities in executive functioning and processing including working memory disturbances (Farinpour, 2000; Martin, 2001, 2003; Mintzer & Stitzer, 2002), the process of problem solving (Bechara, 2001; Bolla, 2003; Grant, 2000; Martin, Mintzer & Stitzer, 2002) and inhibition response (Martin, 2004; Mintzer & Stitzer, 2002). This disorder leads to difficulties in assessing current behaviors and also the results derived from these behaviors. As an example, difficulties in problem solving can lead to responses in which current rewards with less value are preferred to the long term result of such behaviors (Bechara, 2001); Such defects can be the reasons of high-risk behaviors such as unsafe sex, having multiple sexual partners, sharing needles, and other behaviors that increase the probability of HIV transmission and other infectious diseases (such as hepatitis C). Despite the serious need for scientific research in this field, few studies have examined the possible relationships between cognitive deficits and high-risk behaviors among drug users and even less among individuals who are prone to drug abuse. An important issue in studying the relationship between neuropsychological functioning and risky behaviors, is the necessity of examining the personality traits of drug users or people who are prone to substance abuse.
It seems that impulsivity is an intrinsic risk factor of addiction phenomenon. Therefore, it is necessary to evaluate and measure it. Eysenck’s indices include Eysenck’s Personality Inventory (EPI) and the Eysenck’s Personality Questionnaire (EPQ), due to their widely use and also available evidences showing their closely relation to addiction, are noticeable. Although Eysenck’s personality theory is considered noteworthy, but other researchers such as Cloninger (1987) and Zuckerman (1984), have proposed other theories. All of these theories agree on the importance of impulsivity, but Eysenck's theory was the first one among them and more studies have been done based on it. Another reason for the importance of impulsivity is its evolutionary basis. Suomi (1999) suggested that rhesus monkeys showing novelty-seeking behaviors (trying unfamiliar things in their environment) would be more likely to use alcohol. Although this finding may suggest that impulsivity is a characteristic of evolved personality which may be related to substance abuse, a direct comparison between humans and apes must be done carefully. EPI and EPQ questioners have lots of strengths which make them globally attractive as an indicator of personality assessment, and traits which make individual susceptible to addiction. The importance of Eysenck’s indicators is that they all: 1. have been designed based on Eysenck’s strong theory of personality (Eysenck and Eysenck, 1985, quoted by Kaviani (2007) 2) have been available for long time and widely studied. 3. Are parallel and in the same direction with other assessments which are widely used (Zuckerman and Cloninger, 1996). 4. do not have some problems of other measurements; as an example, no questions about using drugs are asked. 5. have been translated into several languages (e.g. Fernando, 1994). The importance of impulsivity in drug abuse is shown in experimental, cross-sectional, and longitudinal studies which used the Eysenck’s questionnaire. Some of them are: the cross sectional study conducted on 149 Spanish women showed a positive association between alcohol consumption and impulsivity characteristics measured by EPQ indicators. Among the personality traits which were studied impulsivity and sensation-seeking had the most significant relationship with alcohol consumption, whereas neuroticism was not associated with alcohol consumption. One experimental study showed that impulsivity rate in alcoholic older adolescents has an inverse correlation with Serotonin levels (Soloff et, al, 2000). In a large random sample of adults, smokers had higher scores on EPQ psychoticism dimension. A cross-sectional study showed that EPQ neuroticism dimension has a strong correlation with nicotine addiction (Kawakami et al, 2000). A longitudinal study using the Eysenck’s EPQ dimensions on young Spanish people aged between 10 to 11 years perusing until the age of 18, showed that psychoticism dimension of Eysenck’s questionnaire is the best predictor of nicotine dependency and smoking (Canals et al, 1997). The link between psychoticism and smoking with both serotonergic and dopaminergic systems has been shown (1991; Gilbert, 1995).

Sensation-seeking which means obtaining and maintaining the highest level of arousal and need for different, new and complicated sensations and tendency to do high-risk behavior to achieve such experiences (Zuckerman, 1984, Zuckerman, 1994) is associated with various types of risky behaviors. These behaviors include risky driving (Jonah, 1997), risky sexual behaviors (Hoyle, 2000), risky exercises, and the inherent tendency of using drugs in addicts. (Crawford, 2003). People who are at high levels in this dimension are much more sensitive to reward signs rather punishment signs (Gray, 1990). Consistent with this theory, people with high score in sensation-seeking are more likely to engage in risky behaviors to gain or search for pleasure whereas people with low sensation-seeking scores may commit risky behaviors for some other reasons (for example, adjustment or matching to the peer groups; Cooper et al,
1998; Sotker, Archer and Allain, 1978 as quoted by Cooper et al, 2003). This data not only indicates the qualitative differences among individuals with high and low scores as the reason for involvement in risky behaviors, but also suggests the quantitative differences are involved in individuals’ risk-taking. In other words people with high sensation-seeking scores (due to their relative sensitivity to reward) are influenced more by short-term interests of risky behaviors, and (because of their relative insensitivity to punishment) are less affected by potentially long-term costs, thus the balance is diverted towards risky behaviors. Consistent with this analysis, sensation-seeking is related to the spectrum of risky and problematic behaviors, as mentioned earlier (Horvath & Zuckerman, 1993; Zuckerman, 1994 as quoted by Cooper et al, 2003).

Among the first research on addict typology of drug addicts and their characteristics in Iran was the research done by Okhovat et al in 1974 on 103 Addicts admitted At Tehran Hospital of Addiction Recovery. Addicted case studies in this research were between the ages of 20 to 40 years old. 61 percent of them were addicted to heroin and 20% addicted to opium. With controlling of age, gender, and education, 89 persons were placed in the control group. Addicts in this research showed psychotic and neurotic characteristics. Addicts’ scores were significantly higher than that of the control group in anxiety, tendency to depression, feeling loneliness, emotional poverty, and feeling of inadequacy indices (Sahebzamani, Mahmoodi, & Moravveji, 2009). Also in another study performed to determine the validity of MMPI short form on some addicted case groups of Vanak Hospital in 1976, researchers reported that addicts’ scores at Pd1, Sc2 and Pt3 scales are significantly higher than normal population (Pahlavyan, et al, 2003).

Porrasi and his colleagues’ (2007) research results suggest that older age, risky behavior, lower age at starting smoking, higher socio-economic class, and prior use of illegal drugs are among factors associated with substance abuse by Iranian students (Porrasi et al, 2007). The results of studies indicate that nearly half of all drug users in Iran start using drugs between the ages of 17 to 22. Khoda-yari-fard and colleagues’ results research (2008) also showed that the students who were prone to drug abuse had lower self-control comparable to those without susceptibility and seemed that people with lower self-control thought less on the outcome of their behaviors and tried to immediately satisfy their desires. Thus such individuals ignore the consequences of drug use and with alcohol consumption and other drugs try to catch immediate pleasure from such materials. On the other hand the high level of self-controlling in this research included elements of self-monitoring, planning and emotional regulation (Zimbard & Boyd, 1999, quoted by khoda-yari-fard et al, 2008).

**Method**

The research method used in this study was casual – comparative method in cross-section form. Descriptive statistics (to calculate mean and standard deviation statistics) and inferential statistics (t test for independent groups) were used to analyze data; the aim of using this method was to identify variables which can predict susceptibility to substance abuse in

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1 Psychopathic Deviate
2 Schizophrenia
3 Psychasthenia
vulnerable groups based on the proposed model in the study. Data was analyzed using SPSS Statistics software Version 17.

Method of sampling from population
Research population was all residents in Tehran in 2010. The clustering randomized technique was used for sampling, so that three districts were selected randomly from the 28 districts of Tehran. Among the quarters of each district, a neighborhood was randomly selected and after performing the Addiction Potential Scale test (APS) two groups were selected: the group who were prone to addiction and the group of normal ones (each group consisting of 30 people). These groups were compared with each other with respect to impulsivity, risk-taking and sensation-seeking indicators.

Measures
Questionnaire was used in this study as data gathering tools. Questionnaires that were used in this study include:

Addiction Potential Scale Questionnaire (APS): to assess addictive potential of drugs. Weed’s subscale for assessing drug abuse was used which was derived from Minnesota Multiphasic Personality Inventory-2 (MMPI-2) normalized in Iran (Minuie and Salehi, 2003 as quoted by Moradi et al, 2008). The original version of the Addiction Potential Scales (APS) consists of 39 questions with "Yes" or "No" response options. Scale content is completely heterogeneous and does not seem to be directly related to substance abuse. Some of its items are related to extraversion, excitement-seeking, and risk-taking whereas other items are associated with low self-esteem, alienation, and cynical attitudes toward others (Graham, 2000).

Reliability coefficients for this scale in the normative sample (with an interval of one week) were obtained as 0.69 and 0.77 for men and women, respectively (Graham, 2000). Weed and colleagues reported that there was a strong covariance among the Addiction Acknowledgement Scale (AAS) and APS and their correlation was 0.57. Weed and colleagues presented evidence that APS is well able to distinguish between mental disorders and substance abusers. Normalized version of APS for Iranian high school students (in Minuie and Salehi, 2003) has 36 items and its reliability has been calculated by Cronbach’s alpha with a value of 53/0 and split-half with a value of 53/0. According to Minuie and Salehi (2003), scores 1 to 18 indicate a very low addictive potential, scores 19 and 20 indicate low addictive potential, scores 21-22 indicate moderate susceptibility to addiction, scores 23-24 show a high potential for addiction, and score 25 and greater than 25 indicate a great potential for becoming addicted (Moradi et al, 2008).

Persian version of the Eysenck Impulsivity Questionnaire (Ekhtiari et al, 2005): The questionnaire has 54 questions which examine three factors in an individual, each with a certain number of questions; Impulsivity: includes 19 questions, venturesomeness: includes 16 questions, empathy: consists of 19 questions. The questionnaire response type is Yes-No multiple choice. So the highest score on this questionnaire would be 54. So far 7 versions of this questionnaire are presented. The 7th version is the last edition that used for assessment in this study.

Persian version of Barrett Impulsivity Scale: This questionnaire which was developed by Barratt (1995) has a strong correlation with Eysenck Impulsivity Scale. The structure of questions collected from both questionnaires is an indicator of some aspects of quick decision-making and
lack of foresight. This index consisting of 30 questions evaluates the following three factors: a) cognitive impulsivity: including fast decision-making. B) motor impulsivity: consists of acting without thinking. C) no planning: is determined with quick navigation or lack of foresight. Questions have been developed as four multiple choice items and the highest score would be 120.

_Persian version of Zuckerman sensation-seeking questionnaire:_ this questionnaire is an assessment scale for individual differences in terms of sensory stimulation preferences and optimal levels of arousal. Its newest version, the V form, was developed in 4 subscales based on the cross-ethnic and cross-gender similarities. The questionnaires related to variety of personality traits, perceptual and cognitive methods, and diversity in experiences of drugs, sexual behavior, alcohol, smoking, dietary preferences, and unusual priorities in plan, intention, voluntarily actions and experiments. The questionnaire consists of 40 items that measure the following four subscales (each with 10 questions) a) Thrill and Adventure: desire for outdoor activities involving unusual sensations and risks or physical injury such as skydiving, scuba diving, climbing and b) Experience-seeking: Referring to new sensory or mental experiences through unconventional choices, also including psychedelic experience, social nonconformity and desire to associate with unconventional people. c) Disinhibition: Preference of “out of control” activities such as wild parties, drinking and sexual variety. d) Boredom susceptibility: intolerance of repetition or boring people, and in other cases showing restless reactions when things are unchangeable. The maximum score for each subscale in the questionnaire is 10 so that total score would be 40.

Results

In this section, we first review the sample profile in terms of gender, age, education, and so on. For statistical analysis, the data has been extracted from the questionnaire and then has been analyzed using the software SPSS in both descriptive and inferential statistics.

<table>
<thead>
<tr>
<th>Indicators</th>
<th>Impulsivity</th>
<th>Risk</th>
<th>Sensation-seeking</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number</td>
<td>60</td>
<td>60</td>
<td>60</td>
</tr>
<tr>
<td>Base Z Kolmogorov – Smirnov</td>
<td>0.89</td>
<td>0.77</td>
<td>1.02</td>
</tr>
<tr>
<td>Significance level</td>
<td>12:41</td>
<td>12:34</td>
<td>12:21</td>
</tr>
</tbody>
</table>

The results show that the Z Scores on impulsivity, risk-taking, and sensation-seeking are respectively 0.89, and 0.77, and 1.02 in the sample and also has a significance level of 0.41, 0.34, and 0.21, which indicate that the distribution of the mentioned variables in the sample are normal.

_The first hypothesis:_

Impulsivity among susceptible individuals to drug abuse is significantly different from control group.
As the above table shows, based on f-Levin test, the assumption of common variance is confirmed. t-statistics obtained from the t-test for independent groups (people prone to substance abuse and normal subjects) is 2.32 and its significance level is smaller than 0.05, which indicates that mean scores for impulsivity among individuals prone to drug abuse and normal individuals are significantly different, in other words we can say that in the α level 0.05 there is statistically significant differences in mean scores for impulsivity between patients who are prone to substance abuse and normal subjects, and impulsivity scores among individuals prone to drug abuse are higher than those of normal individuals.

**The second hypothesis:**

People who are prone to drug abuse and controls are significantly different in risk-taking.

As the above table 3 shows, based on f-Levin test, the assumption of common variance is confirmed. t-statistics obtained from the t-test for independent groups (people prone to substance abuse and normal subjects) is 2.25 and its significance level is smaller than 0.05, which indicates that mean scores for risk-taking among individuals prone to drug abuse and normal individuals are significantly different, in other words we can say that in the α level 0.05 there is statistically significant differences in mean scores for risk-taking between patients who are prone to substance abuse and normal subjects, and impulsivity scores among individuals prone to drug abuse is higher than those of normal individuals.

**The third hypothesis:**

People prone to drug abuse and the control group are significantly different in sensation-seeking.

As the above table 4 shows, based on f-Levin test, the assumption of common variance is rejected. t-statistics obtained from the t-test for independent groups (people prone to substance abuse and normal subjects) is 2.07 and its significance level is greater than 0.001, which
indicates that mean scores for sensation-seeking among individuals prone to drug abuse and normal subjects are not significantly different, in other words we can say that in the α level 0.05 there is not statistically significant differences in mean scores for sensation-seeking between patients who are prone to substance abuse and normal subjects, and impulsivity scores among individuals prone to drug abuse is higher than those of normal individuals.

Conclusions

In this section we compare out results with other studies. The studies which are consistent or contradict with the findings of this study have been examined. In this section the general discussion about the obtained results has been presented at first. Then, results have been examined in relation to each hypothesis more specificity and then we explain the results of this research with respect to research literature. In the two final sections we present the theoretical and applicable limitations and recommendations of our work.

According to information contained in Table 2 and considering the significant difference between the calculated mean for impulsivity score and rejection of the null hypothesis, we concluded impulsivity traits are different between the two groups with 95% confidence so that the group prone to drug abuse are more impulsive. This finding is consistent with Cyders and colleagues’ (2007), Smith et al.’s (2007) and Miller et al.’s (2003) research results. Common denominator of these studies is that impulsivity is a significant factor that distinguishes susceptible individuals with tendency to unauthorized material and it is strongly correlated with severity of addiction as well. The research findings reveals the decision-making disabilities of individuals with substance-related disorders, and this result is consistent with the impulsivity as a vulnerability marker for substance-use disorders (Verdejo-Garca, Lawrence, Clark, 2008). Studies with animal models have shown that it is possible to damage the animal's performance in tests related to inhibition control with the short-term drug injection (equals to impulsivity in the field of Neuropsychology and Cognitive Science) (Gimenz, et al, 2002, as quoted by Garcia Lawrence and Clark, 2008).

In most of the studies conducted on the relationship between impulsivity and addiction was shown that the impulsivity levels assessed by Barrett Impulsivity Scale (BIS) in a group of cocaine-dependent outpatients and recreational drug users remain high even after controlling for the effects of antisocial personality disorder (Leland, & Paulus, 2005). Müller et al.’s research (2002) also showed high impulsivity put people at higher risk for recreational drug use.

Some studies suggest that high impulsivity can have important role in starting substance use in adolescence. The relationship between impulsivity in adolescence and substance-related disorders in one study suggested that students ranked more careless and more impulsive at the age of 11 by their teachers were more likely to begin drinking alcohol before age 14 (Majk et al. 2001). Slutske and colleagues (2005) in their study showed that severity of impulsiveness in adolescence can significantly predict gambling behavior in later assessments.

These results are the proof for the issue that impulsivity is a hidden variable in the foundation of natural personality structure which can be considered as the best way to describe addiction and accordingly preventive program can focus on this field.

According to information contained in Table 3 and considering the significant difference between the calculated mean for risk-taking score and rejection the null hypothesis we concluded
with 95% confidence that personality traits associated with risk-taking differ in the two groups so that the group who are prone to substance abuse are more risk-taking in other words. The result is consistent with the various studies that have examined the relationship between risk-taking and personality factors. Risk-taking and sensation-seeking in slinky activities of illegal drug use, unprotected sexual relations with multiple partners and in routine activities of daily life such as driving has been detected (Zuckerman, 1994). Taylor and Hamilton (1997) also showed that people who are more impulsive and are in higher sensation-seeking states than others, immatures take risky behavior. However, one experimental study based on this model showed that women who behave more risky with compensatory incentives do it as a professional job and contrary to the predictions of Zuckerman’s initial model their sensation-seeking level is not also high, on the other hand risk-taking can be considered as an independent factor. This result is also consistent with the conclusion that counts the risk-taking as a pathological factor for a range of mental pathologies and indicates it can make individuals susceptible for tendency to unauthorized material.

According to information contained in Table 4 and considering that difference between the calculated mean for sensation score is not significant and so not the confirmation of null hypothesis, we concluded that the hypothesis in α level 0.05 is not valid and there is no significant difference between the group prone to drug abuse and the group of non-susceptible to addiction. These findings are not consistent with studies of Rio (2006), White et al (2005) and Hawkins and colleagues (1992, cited in Kelly and colleagues, 2006) which suggested the sensation-seeking as an effective factor on starting tendency to illegal substances. Depot and Collins (1999, quoted in Kelly and colleagues, 2006) demonstrated this trait has a strong correlation with impulsivity and sensitivity to reward has a strong, and has moderate correlation with the two major personality dimensions which are extraversion and frustration tolerance.

Studies on animal subjects have shown animals exhibiting a greater degree of novelty-seeking behavior are more sensitive to the effects of stimulant drugs (Bardot et al. quoted in Kelly et al 1996, 2006). Hutchison and colleagues (2006) have shown in a recent clinical study that people with higher sensation-seeking are also more sensitive to behavioral effects of stimulation drugs. But, not all studies have found such a link between sensation-seeking and a desire to use drugs. The researchers of this study tried to examine and analyze personality and motivate traits associated with vulnerability to addiction in population of Tehran by adopting a psychological approach and in the framework of trait-theory of personality. Based on findings of this study people prone to addiction are at a higher level compared with the control group in terms of impulsivity, risk-taking and sensation-seeking.

The sense of these findings in one-sentence summery would be we should accept that genetic and biological aspects which emerge themselves into traits have a noticeable role in individuals’ vulnerability to addiction. To explain these traits, the researchers were relied on finding of behavioral genetics and also pioneers of this field like Eysenck and Jeffrey Gray. Eysenck found the footprints of these traits (1975, quoted in Kaviani 2007) in the specific level of brain activities, especially the Ascending Reticular Activating System (ARAS). This system is involved in activation of the cortical centers and also effects on regulation of conscious (aware) states. Based on Eysenck’s findings, individuals who get higher scores in the scale associated with inhibition such as extraversion, impulsivity and risk-taking have lower cortical arousal and higher sensory threshold than others. So to keep up the level of their brain activities, they are
forced to seek stimulation and avoid monotony. These people hunt for exciting and stirring environments because they are thirst for incitement. In contrast, people who are at a lower level in terms of these traits are easily motivated, and thus avoid stimulus. The findings suggest that assessment of personality traits may be capable of providing the opportunity to predict the incidence of drug use, or to predict individuals’ drug dependency and eventually their ability to stop using drugs (relative To dependency rate) by means of comprehensive evaluation of impulsivity, risk-taking and sensation-seeking; and with the accurate attention to various aspects of these attributes provide the possibility to develop causal-oriented therapeutic methods such as reinforcing the decision-making, and to control the inner drives and etc. in the near future.

References


