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Quick Response Code:

Website: www.jehp.net
DOI: 10.4103/jehp.jehp_153_17

Predictors of substance abuse among risky drivers: The role of personality characteristics and mental health

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Abstract:

BACKGROUND: Regarding the high prevalence of substance abuse and its serious complications, the necessity of assessing factors assuming to make tendency toward substance abuse is justifiable.

MATERIALS AND METHODS: The statistical population consisted of all car drivers referred to traffic department in 2015 in Kermanshah. In this descriptive study of correlation type, 846 risky drivers from referrals to traffic department were randomly selected. Data were analyzed through NEO personality inventory, general health questionnaire, and discriminant analysis.

RESULTS: Discriminant analysis was used to analyze data. Standard coefficients of discriminant function revealed that depression, social functionality, physical symptoms, neurosis, and anxiety symptoms were of the highest role in discriminant function while agreeableness and conscientiousness had the least role in discriminant function and its success. The discriminant analysis also showed that linear combination of above variables is able to explain about 75.5% of variance of difference between two groups ($P < 0.0001$).

CONCLUSIONS: Regarding the results of this study, it is proposed that the role of personality characteristics as well as mental health in tendency toward substance abuse could be appreciated and included in preventive and treatment programs held for people with methamphetamine abuse.

Keywords:

Mental health, personality characteristics, substance abuse

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Received: 28-10-2017

Accepted: 16-02-2018

Introduction

Road traffic injuries are among the most important health problems demanding effective and sustained measures to be prevented. Most of the times, the causes of such accidents are personal and social problems such as substance abuse.^[1,2] In Iran, driving is one of the most dangerous jobs. Heat, cold, lack of accommodations, and rest as well as being so far away from family are among the most prominent difficulties. Drivers of heavy vehicles are more exposed to fatigue, sleepiness, and musculoskeletal pains because of longer times of driving which lead to increased risk of driving

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accidents. Some drivers come to believe that substance use would decrease their fatigue and sleepiness while studies suggest that the use of any psychoactive substance may increase the risk of crashes.^[3-5]

Review of literature shows that numerous biological, psychological, social, and familial factors are related to substance abuse among drivers and other people.^[6] Personality characteristics are considered to be one of these factors. Personality characteristics of substance abusers are not merely results of abuse, but many of them have had mental and personality problems before addiction which are intensified after drug abuse suggesting an interrelation between substance abuse and personality features.^[7]

How to cite this article: Abdoli N, Farnia V, Salemi S, Tatari F, Shakeri J, Basanj B, *et al.* Predictors of substance abuse among risky drivers: The role of personality characteristics and mental health. *J Edu Health Promot* 2018;7:163.

Since an individual's personality has a decisive role on his or her overt behavior, determination of personality characteristics can be of importance in the prevention of substance abuse.^[8,9] In different studies, the effects of some personality features such as sensation seeking, impulsiveness, and immaturity in tendency toward substance abuse have been shown.^[10-12] Wagner revealed that drug abusers had higher scores in neurosis factor and lesser scores in factors of agreeableness flexibility and conscientiousness.^[13] In another research, Fisher *et al.* noted two personality features of high neuroticism and low conscientiousness which were important in frequent relapses after the treatment of substance abuse using 5-factor personality inventory.^[14]

Mental health also is one of the variables which can be related to substance abuse.^[15] The prevalence of substance abuse is 2–3 times higher in people with psychological problem compared to general population. Mental disorders of higher reports in drug addicts are paranoid thinking, obsessive-compulsive disorder, sensitivity in mutual relations, physical complaints and depression, antisocial personality disorder, phobia mania, and schizophrenia.^[16]

Substance abuse increases mental health problems, and various studies have shown the relationship between mental health and substance abuse.^[17-19] For example, Russell *et al.* showed that loneliness is related to psychosocial problems such as alcoholism, suicide, anxiety symptoms, depression, and substance abuse.^[20] It can be said in general that comorbid mental disorders are important factors in etiology, prognosis, and vulnerability of drug abusers.^[21] In other words, lifetime prevalence of substance abuse is about 20%, and most of substance abusers bear at least one comorbid mental disorder diagnosis.^[22-25] Thus, substance abuse can be considered as a biopsychological disorder in which many preaddiction backgrounds play a role in its formation. Recognition of these factors can be effective in control and prevention of substance abuse.

Drug abuse can result in various personal, familial, economical, social, and cultural complications. Drug may affect driving skills, the ability to keep distance from other cars and coordination in driving, one's perception of his/her way of driving, one's perception about his/her distance from others, the behaviors of other drivers, the level of concentration and precision, reaction time, judgment, and finally, the problem solving skills of the driver. Driving skills demanding faster reactions are more affected by substance abuse. Regarding the facts above, assessment of the contingents of addiction in car drivers seems to be a necessity. Previous researches in this era are mostly epidemiological surveys about abusers, and the variables of predicting drug abuse

such as personality characteristics and mental health are given lesser due considerations. Substance abuse has been known to be related to health problems such as increased risk of mortality due to interpersonal violence, road crashes, increased high-risk sexual behavior, and HIV infection as well as educational problems which make the study of substance abuse important. Regarding the high prevalence of substance abuse and lack of the studies related to etiology of tendency toward drug abuse in drivers, this study was done to assess the role of personality characteristics and mental health in substance abuse among drivers.

Materials and Methods

This study is a descriptive research of correlation type designed to predict group memberships (drug abusers and normal people) as well as discriminant equation. Discriminant analysis was used to analyze data. Data were analyzed using SPSS statistical software version 17.0 (IBM Corp.: Armonk, NY, USA).

The study population consisted of all risky drivers whose driving licenses or vehicles were detained due to unauthorized speed or overtaking, sleepiness, drug or alcohol use, or aggressive driving ended in urban or road car accidents in 2014–2015. The sample volume was 1008 and participants were randomly selected from a reported list by traffic department of Kermanshah Province. In next step and after coordination with authorities in charge, two of our colleagues attended the obligatory educational classes held for recognized risky drivers by traffic department.

Our project was explained and questionnaires were delivered to those who agreed to participate in our study. One hundred and sixty-two participants were omitted due to incomplete answering to our questions, so the total analyzed participants were 846. The present sample volume was determined regarding Fergusson, Swain-Campbell, and Horwood study.^[26] Among all participants, 407 were risky drivers of negative addiction (stimulants and tranquilizers) tests and 432 were risky drivers with positive addiction tests. The definition of risky drivers was derived from the traffic department act (No. 204361/41464) upon determination of instances and titles of driving violations regulated by ministry of interior. The inclusion criteria were risky drivers with detained driving licenses due to driving violations, junior high school grade at least, and male gender. The exclusion criteria were history of mental disorder or severe physical symptoms.

NEO 5-factor personality inventory

The brief version of the NEO five-factor inventory is a 60-item instrument designed to evaluate five main

personality factors (neuroticism, extraversion, openness, agreeableness, and conscientiousness). This inventory was performed by McCrae and Costa on 208 American students in a 3-month interval which resulted in validity coefficients between 0.83 and 0.75.^[27]

In Iran, Garosi and Farshchi applied NEO test for norm finding of the test on a sample of 2000 students of Tabriz and Shiraz universities which resulted in correlation coefficients between 0.56 and 0.87 for five main dimensions. Cronbach's alpha coefficients for each main factor of neuroticism, extraversion, openness, agreeableness, and conscientiousness were 0.86, 0.73, 0.56, 0.68, and 0.87, respectively. To assess the content validity of the test, the correlation between two forms of personal report and observer assessments was calculated showing a maximum correlation of 0.66 for extraversion factor and a minimum amount of 0.45 for agreeableness.^[28]

General health questionnaire

This 28-question questionnaire was introduced by Goldberg and Hillier for the screening of mental disorders in general population. This questionnaire has 4 subscales (somatic, anxiety, social function, and depression symptoms) with 7 questions for each subscale. Likert scale is used for scoring with not at all (0), no more than usual (1), rather than usual (2), and much more than usual (3) as response to any question which results in a total score range of 0–84. General health questionnaire has been tested in different studies and its reliability and validity confirmed. William, Goldberg, and Mary (1988) reported the validity of 80% for the test. In Iran and by Saatch (2010), the total correlation coefficient of all subscales of the test was reported as 84%.^[29]

Ethical considerations

The complete and clear information on the purpose of the research was given to all participants and they were assured that the questionnaires would be anonymous. Furthermore, we told them, "If they do not want to continue the project, they can leave the project at each stage."

Results

Table 1 shows mean and standard deviation values of each independent variable between normal and substance abuse a group.

In Table 2, box test showed covariance matrix value of 22.39 for normal people group and 26.59 for substance abusers group which equality testing of covariance matrices through Box's M test revealed that covariance matrices of two groups have statistically meaningful differences ($f = 150.8$ and $P < 0.001$). Regarding the very

Table 1: Descriptive statistical values separated for groups between two groups of normal and substance abuser participants

Variable	Group	n	Mean group	SD
Neuroticism	Normal	407	28.61	6.66
	Substance abuser	439	30.08	5.89
Extraversion	Normal	407	30.04	5.12
	Substance abuser	439	29.26	6.06
Openness	Normal	407	24.82	3.87
	Substance abuser	439	24.61	2.92
Agreeableness	Normal	407	19.43	5.73
	Substance abuser	439	20.97	48.5
Conscientiousness	Normal	407	34.97	6.33
	Substance abuser	439	31.79	7.30
Somatic symptoms	Normal	407	4.12	2.50
	Substance abuser	439	7.41	4.24
Anxiety symptoms	Normal	407	3.66	2.41
	Substance abuser	439	6.70	4.10
Social function	Normal	407	5.43	2.62
	Substance abuser	439	6.87	3.25
Depression	Normal	407	1.32	1.93
	Substance abuser	439	5.45	5.38

SD=Standard deviation

minor differences between covariance matrices of two groups, this meaningfulness can be attributable to high sensitivity of this test with proportion to the big sample sizes, the value of canonical correlation which is $R = 0.552$ showed a medium relation between discriminant scores and study groups, and the discriminant function has been able to discriminate normal and substance abusers groups. The statistical value of Will's Lambda (0.695) and Chi-square (305.508) as well as their significance level ($P < 0.009$) shows the difference of means between groups [Table 2].

Canonical discriminant factor coefficients along with standardized discriminant factor coefficients, classification factor coefficients, as well as structural matrix coefficients are shown in Table 3. These results reveal that among 10 assessed independent variables, depression, somatic symptoms, neuroticism, anxiety symptoms, and social functioning, respectively, had higher independent dispersions compared to other independent variables and have the highest roles in discriminant factor. Variables of agreeableness and conscientiousness with 0.012 and 0.045 coefficients, respectively, had the minimum role in discriminant factor and its success.

Classification of normal people and substance abusers through classification factor coefficients was performed as follows [Table 3]:

Classification factor of normal individual group = (constant number) + (neuroticism) + (extraversion) + (openness) + (agreeableness) + (conscientiousness) +

Table 2: Results of tests performed in discriminant analysis page

Covariance matrix values (Box's M test)		Covariance matrix equality test in two groups(Box's M test)			Determination of explanatory power (eigenvalue)	Determination of discriminant scores and groups (canonical correlation)
Normal	Substance abuser	Box's M	F	P	λ	R_c
22.39	26.59	719.050	15.800	<0.0001	0.439	0.552

Table 3: Canonical discriminant factor coefficient values standardized canonical discriminant factor coefficients, classification factor coefficient, and construct ural coefficient matrix

Variables	Canonical discriminant factor coefficient	Standardized canonical discriminant factor coefficient	Classification discriminant factor coefficients		Construct ural coefficient matrix
			Substance abusers	Normal	
Neuroticism	0.057	0.349	0.820	0.754	0.181
Extraversion	0.046	0.261	0.752	0.813	0.105
Openness	0.023	0.089	1.564	1.534	0.042
Agreeableness	0.002	0.012	1.359	1.362	0.199
Conscientiousness	0.007	0.045	0.601	0.610	0.350
Somatic symptoms	0.135	0.474	0.734	0.556	0.705
Anxiety symptoms	0.049	0.166	0.104	0.39	0.676
Social functioning	0.056	0.167	0.752	0.677	0.366
Depression	0.126	0.516	0.050	0.216	0.760
Constant	2.436		72.768	69.575	

(somatic symptoms) + (anxiety symptoms) + (social functioning) + (depression).

Classification factor of substance abusers = (constant number) + (neuroticism) + (extraversion) + (openness) + (agreeableness) + conscientiousness + (somatic symptoms) + (anxiety symptoms) + (social functioning) – (depression).

In Table 4, number and percentage of people which are properly or by mistake classified into two groups are demonstrated. Classification results show that 346 of normal individuals properly lie in normal group and 61 (15%) classified as substance abusers by mistake. Of substance abusers, 290 (66.1%) were properly classified.

Moreover, 149 (33.9%) individuals were wrongly classified as normal people and lied in normal group, so the classification precision for normal individuals was 85% and this precision for substance abusers was 66.1%, and regarding classification accuracy for both groups, 75.2% of individuals were properly classified.

Discussion

This research was done the objective of predicting the occurrence of substance abuse in risky drivers considering and based on personality characteristics and mental health. Data analysis showed that among personality characteristics, neuroticism had an important role in predicting abuse. This finding was in agreement with McCormick *et al.*^[30] which reported neuroticism a main factor for tendency toward substance abuse. In another study, Watson and Clark pointed out that

Table 4: Classifying individuals into two groups of normal and substance abuser individuals based on leave one out method

Group	Predicted group for membership		Total
	Normal	Substance abuser	
Main group, n (%)			
Normal	346 (85.0)	61 (15.0)	407 (100.0)
Substance abuser	149 (33.9)	290 (66.1)	439 (100.0)
Crossed valid group, n (%)			
Normal	342 (156)	65 (283)	407 (439)
Substance abuser	84.0 (35.5)	16.0 (64.5)	100 (100)

neurotic people do not provide themselves with the opportunity to review their problems and understand situation properly, and due to wrong cognitive evaluations, they are mostly anxious, aggressive, and vulnerable. Neuroticism accompanies with more experienced negative emotion tendency toward higher emotional instability, anger, and discomfort. Neurotic individuals are often impulsive and abused substance to get relieved from anxiety symptoms as well as perceived social pressures.^[31,32]

- The other findings of this study were that among mental health subscales depression, anxiety symptoms, and somatic symptoms had an important role in prediction of occurrence of substance abuse; this finding is congruent with Russell *et al.*,^[20] Hellem *et al.*,^[19] and Haglund *et al.*^[18] As an explanation, it could be said that people with problems such as depression and high anxiety symptoms have got poor

adaptation skills toward environment situations and might think illogically when it comes to adaptation with outside stressors.

Moreover, these people are less capable to express their emotions, beliefs, and needs, making them vulnerable to drug abuse. People with mental disorders sometimes use drug to escape from daily problems. They take refuge in drug as a substitute for their melancholic life which is full of tension and stress.

On the other hands, abuse and mental health problems are not separate entities and rather are components of a whole which is affected by other aspects of life. Low economical status, unemployment, low education, and marriage in low age all increase the vulnerability of substance abusers to life daily problems and expose them to the increasing risk of being mentally ill.^[33,34]

It could be said also that substance abuse and mental disorders have got bilinear relations and drug abuse can even be a psychosis psychiatric problem. Psychological problems are causes for tendency toward drug abuse and could become aggravated after using substances which elicits a defective cycle in which more severe mental problem increases abuse which induces more psychologically defined symptoms.^[18,20,34]

As limitations, this study was sectional and there was a possibility for selection bias and unreal respondent's reports because of self-report questionnaires. Another limitation was not assessing the intermediate variable in this study.

Regarding the high prevalence of substance abuse and its economical as well as psychological outcomes for patients, their families and society recognizing people at risk can be of value and significance.

Conclusions

The findings of this study can be useful in recognition of people at risk of substance abuse which helps to plan for the therapeutic as well as preventive measures. Results of this study are also helpful for clinicians dealing with substance abuse patient's treatment. It is suggested to assess various factors which have role in predisposition toward substance abuse in future studies to earn a more accurate knowledge about predicting factors of tendency toward substance abuse.

Acknowledgments

This research was approved by the Research Council of Imam Reza International University and was licensed by the Kermanshah Province Traffic Department Research Committee under code 32.48.9.122. The authors thank

the staff of Department of Psychiatry, Substance Abuse Prevention Research Center, Kermanshah University of Medical Sciences, Kermanshah.

Financial support and sponsorship

This study was financially supported by Department of Psychiatry, Substance Abuse Prevention Research Center, Kermanshah University of Medical Sciences, Kermanshah, Iran.

Conflicts of interest

There are no conflicts of interest.

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