

An Evaluation of the Relationship between Mental Disorders and Driving Accidents among Truck Drivers

Abstract

Introduction: A review of the existing literature shows the importance of mental health in preventing traffic accidents. Therefore, the current study aims to determine the mentioned mental disorders in relation with the history of accidents among truck drivers. **Methods:** This cross-sectional study was done with two groups of truck drivers (with and without a history of accidents) in Iran. 56 people with a history of accidents and 410 people without a history of accidents participated in this study. At first, using questionnaires, the demographic information of the participants including age, education level, cigarette use, and addiction to drug was collected. Then, the mental disorders of the participants were evaluated by a 71-question, short form of the multidimensional Minnesota Multiphasic Personality Inventory (MMPI). The evaluated disorders are the HS or hypochondria, D or depression, HY or hysteria, Pd or social mental deviation, Pa or paranoia, Pt or mental weakness, Sc or schizophrenia, and Ma or hypomania. The tests used for data analysis include descriptive tests and Chi square. **Results:** Man-Whitney U test showed that status of mental disorders, as revealed by the MMPI questionnaire, had a significant difference between the two groups with and without history of driving accidents ($P < 0.001$). The results showed that mental disorders of depression, hysteria, social mental deviation, paranoia, schizophrenia, and hypomania in individuals with history of driving accidents led to meaningful differences from individuals without history of driving accidents ($P < 0.048$). **Conclusion:** The results of the current study showed that generally, individuals with history of driving accidents had significantly more mental disorders than people without history of driving accidents.

Keywords: Driving accident, mental disorders, MMPI, truck drivers

Introduction

Driving accidents are one of the most common accidents in the world. They cause 1.24 million deaths in the world each year and are the reason behind the disability and inability of 20 to 50 million people annually.^[1] It is estimated that if suitable measures are not effectively in place by 2020, mortalities from road accidents will increase in countries with low and medium income by up to 80%.^[2] The world hygiene organization predicts that, in 2020, mortality from driving accidents will reach to 2.34 million persons.^[3] Unfortunately, driving accidents have a very high incidence in Iran and are the second-highest cause of mortality.^[4,5] Annually, 200,000 road accidents occur in Iran, with an average of 72 deaths each day resulting from such accidents.^[6] Based on the forensic data in Iran, 9,317 people have died from driving accidents in the

first semester of 2014.^[7] This imposes direct costs (such as medical expenses) and indirect costs (mental problems and depression in family members, detrimental effect on the labor force) on the country, as a whole.^[8] The economic expenses of driving accidents in underdeveloped countries run to between 1% and 1.5% of the gross national product (GNP) and in developed countries, it is about 2% of the GNP.^[9] There are several reports that show a large proportion of the driving accidents is related to the truck and heavy vehicles drivers. Attarchi *et al.* performed a study on 1136 Iranian heavy vehicle drivers and the results indicated that the rate of the reported accidents was 7.7% in one year.^[10] As well as, in the study of Giroto *et al.* on 665 male drivers, 7.2% and 41.7% of truck drivers reported the histories of accidents and near-miss accidents in the previous 12 months, respectively.^[11] The results of a study in the United States also

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demonstrated that 2.6% of long-haul truck drivers have experienced a truck crash within one year and 24% of them had at least one near-miss in the last 7 days.^[12]

Driving accidents are a social problem and there is a need to identify and provide effective infrastructure. This would comprise the cultural, mental, sociological, judicial, and medical factors, as well as responsible advertising and ensuring the quality of the cars manufactured. Many studies have tried to determine the role played by the different factors when it comes to driving accidents. It seems that human behavioral factors are the main reasons in 60% of such accidents and are effective factors in 95% of them.^[13,14] Several studies show a possibility of the emergence of antisocial behavior and violence while driving, which has a significant relation with road accidents.^[15] In addition, studies show that the drivers' personality characteristics, stress levels, and human behavioral factors determine a driver's accident history or the lack of it.^[16,17] Many evidences show that factors such as emotional instability, sorrow, antisocial behavior, or mental pressure play a role in driving accidents, being detrimental to a driver's sense of caution, attention, responsibility, care, and consciousness.^[18] Mental disorders increase reaction and understanding time in a driver and raised reaction time has an important role in driving accidents.^[19] A review of the existing literature shows the importance of mental health in preventing traffic accidents. In fact, mental health affects the way one drives, as found in people living with mental disorders.^[18] Given the high burden of costs in the heavy vehicle accidents, this issue is especially important in the truck drivers. Hilton *et al.* concluded that the severe mental health disorders such as depression affect significantly the driving performance of the heavy goods vehicles and increase the statistics of the crashes.^[20] In Iran, recently, some attempts have been made to test truck drivers on their mental health and the drivers are evaluated for mental disorders such as hypochondria, depression, hysteria, social mental deviation, paranoia, mental weakness, schizophrenia, and hypomania. Due to the importance of this subject, the current study aims to determine the mentioned mental disorders in relation with the history of accidents among truck drivers.

Methods

Participants

This cross-sectional study was done with two groups of male truck drivers (with and without a history of accidents) in Iran. We used a categorical randomization sampling method. This study was done with the help of the traffic police department in Isfahan province and the road violence and accidents unit of Iran. Information gathered from police records and lists included the names of drivers in Isfahan province, age of them, status of their driving licenses, status of their drug addiction, phone call numbers of them, the accident histories of them, the severity of the accidents, and the causes of the accidents. This data was received from the police central

database that is used to analyze the annual crashes. The data were valid and comprehensive, because those are frequently updated after issuing the driving licenses and after occurring the road accidents. Based on the reports and the lists by the road violence and accident unit of the traffic police, we formed two groups of individuals—people who have had an accident in the past 5 years and were blamed and people who have had no accidents in the past 5 years. This was the population we hoped to include in the study. The criteria for entering both groups to the study included a longer than 5-year history of driving trucks, age range from 30 to 40 years, and no history of drug addiction. Based on the inclusion criteria, 500 people with a history of accident and 500 people without a history of accident were entered to the study. The exclusion criteria included the lack of driving license, accident caused by talking on a mobile, the use of alcohol, the use of drugs unrelated to mental disorders, and drowsiness. Then, based on the criteria, 56 people with a history of accidents and 410 people without a history of accidents were selected from both groups.

Data collection

The selected individuals were called and were invited to participate in the study. At first, by using questionnaires, the demographic and accidents history information of the participants was collected. This includes age, cigarette use, addiction to drug, and history and severity of driving accidents in the past 5 years. In addition, the participants were asked to furnish legal documents to confirm the information. We also considered non-addiction certificates and drug test results to confirm the information received. In Iran, performing drug and addiction test is required for issuing the heavy vehicle-driving license. Therefore, the non-addiction licenses issued by police were received from the participants. In the next stage, the mental disorders of the participants were evaluated. In order to do this, a 71-question, short form of the multidimensional Minnesota Multiphasic Personality Inventory (MMPI) was used, completed by both the participant groups. The questionnaires were administered and completed upon receiving the participants' consent. In addition to the mentioned information, information related to history and severity of accidents of the participants were asked from the road accidents and violation unit.

Instruments

A researcher-made questionnaire was used to collect demographic and driving accidents information including age, cigarette use, addiction to drug, and history and severity of accidents in the past 5 years. As well as, short form of the multidimensional Minnesota Multiphasic Personality Inventory (MMPI) was applied to evaluate the status of the mental disorders in the participants. MMP is widely used around the world. This questionnaire was prepared by Hatchway and Mckindly in 1943. The main framework of it includes 504 positive sentences, which

are answered by yes or no. The MMPI was reduced to 71 questions by Canon in 1967. The MMPI test has 11 scales, of which three are related to test validity (the L scale, which relates to the referee’s attempt rate for presenting positive description from itself, the F scale which deals with the rate of deviation and exceptional answers by the individual, and the K scale that focuses on individual attempts for denial pathology or exaggeration in pathology) and eight other scales relate to the clinical or personality indexes. These scales include the HS scale or hypochondria, D or depression, HY or hysteria, Pd or social mental deviation, Pa or paranoia, Pt or mental weakness, Sc or schizophrenia, and Ma or hypomania. The contents of most of the MMPI questions are related to psychiatry, psychology, neurology, or symptoms of physiological disease. The way of answering these tests is in the form of a correct answer which carries one point and incorrect answers worth zero. Okhovat and Daneshmand confirmed the validity of the 71-question form of MMPI in Iranian population and reported an alpha coefficient of 0.78 for the entire test.^[21] Studies on the validity of the MMPI test show that this test has high levels of stability and internal homology. The stability for all MMPI scales was proved in a meta-analysis study and the range of stability coefficients changes was reported between 0.71 for the Ma scale and up to 0.84 for Pt.^[22] Mootabi examined the reliability of MMPI questionnaire in Iranian population and the results showed that the mean of the correlation coefficients was between 0.50 and 0.90 through retest.^[23]

Statistical analyses

Finally, the information was analyzed by using the SPSS statistical software. The normality of data distribution was checked by Kolmogrov–Smirnov test. The participants were categorized based on status of driving accidents history (with and without accidents history), severity of driving accidents (without history of accidents and with history of low, medium, and high severity of accidents), status of mental disorders (with and without mental disorders), and type of mental disorders. Then, the difference of the age of participants in two groups including with and without history of accidents was evaluated by independent sample t-test. In addition, Man–Whitney U test was used to investigate the difference of the history of driving accidents between the two groups including people without mental disorders and people with mental disorders. As well as, Chi square and fisher tests were applied to evaluate the meaningfulness of the history of the

driving accidents and the severity of the driving accidents in individuals with depression, hysteria, social mental deviation, paranoia, and schizophrenia mental disorders as opposed to people without mental disorders, separately.

Results

Results of Kolmogrov–Smirnov test showed that the distribution of the data was normal ($P > 0.05$). The mean age of the participants was 42.98, with a standard deviation of 9.13. The result of the independent t-test showed that individual age did not lead to significant differences between the two groups of participants—with and without accident history ($P = 0.125$). In addition, all participants had non-addiction license. The statistical distribution of status of mental disorders in people with and without driving accident history is shown in Table 1. Based on the results, 446 people and 223 people of the participants were with and without mental disorders, respectively. The results of the Man–Whitney U test showed that the status of mental disorders, as revealed by the MMPI questionnaire, had a significant difference between the two groups with and without history of driving accidents ($P < 0.001$).

Table 2 shows the statistical distribution of the types of mental disorders in people with and without history of driving accidents. In order to evaluate the meaningfulness of mental disorders of hypochondria, mental weakness, and hypomania in people with and without history of driving accidents, the Fisher test was used. In order to evaluate the meaningfulness of mental disorders of depression, hysteria, social mental deviation, paranoia, and schizophrenia in people with history of different severities of the driving accidents, we used the Chi-square test. The results of the Fisher test showed that the mental disorder of hypomania had a significant difference in subjects with history of driving accidents from that in subjects without history of driving accidents ($P = 0.03$). Based on the results of the Chi-square test, the mental disorders of depression ($P = 0.002$), hysteria ($P = 0.048$), social mental deviation ($P < 0.001$), paranoia ($P = 0.001$), and schizophrenia ($P < 0.001$) in individuals with history of driving accidents led to meaningful differences from individuals without history of driving accidents.

However, the differences of mental disorders of hypochondria ($P = 0.477$) and mental weakness ($P = 0.395$) in persons with history of driving accidents compared to those in people without history of driving accidents were

Table 1: Statistical distribution of status of mental disorders in people with and without driving accidents history

Parameters	People with history of the driving crashes, n (%)	People without history of the driving crashes, n (%)
People with mental disorders*	77 (34.5)	146 (65.5)
People without mental disorders**	56 (22.0)	410 (88.0)

*People with mental disorders are individuals who have some mental disorders based on the results of the MPPI evaluation. **People without mental disorders are individuals who have no mental disorders based on the results of the MPPI evaluation

not significant. In addition, statistical distribution of the types of mental disorders in people with history of different severities of the driving accidents is shown in Table 3. Figure 1 also indicates the severity of driving accidents

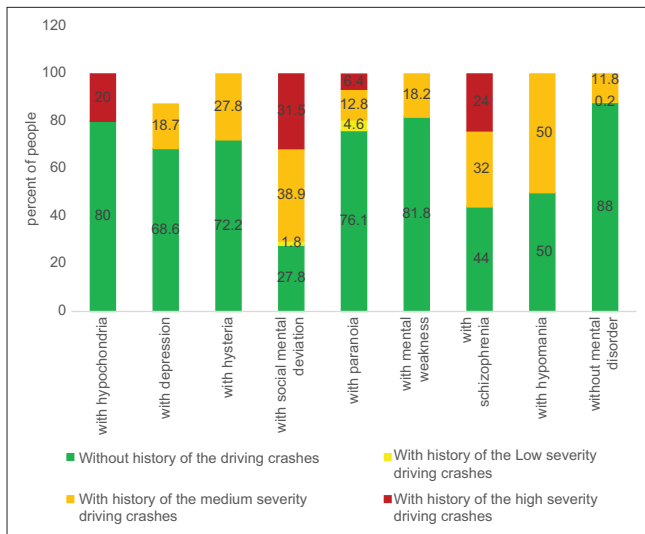


Figure 1: The severity of driving accidents in individuals with different types of mental disorders

in individuals with different types of mental disorders. The results of the statistical tests also showed that mental disorders of depression ($P = 0.001$), hysteria ($P = 0.047$), social mental deviation ($P = 0.001$), paranoia ($P = 0.001$), schizophrenia ($P < 0.001$), and hypomania ($P = 0.005$) in individuals with history of different severities of driving accidents have significant differences. However, the differences of mental disorders of hypochondria ($P = 0.471$) and mental weakness ($P = 0.530$) in individuals with history of different severities of driving accidents were not significant. In addition, not only the relationship between mental disorders in the MMPI test and accident history in past 5 years is meaningful, these disorders are predictive of severe accidents. The abundance distribution supports this conclusion and according to the study's inclusion and exclusion criteria and putting aside non-human reasons, we can observe severe accidents only in the group with mental disorders, as revealed in the MMPI test.

Discussion

The results of the current study show that individuals with mental disorders have a significantly higher chance of driving accidents than individuals without mental disorders.

Table 2: Statistical distribution of the types of mental disorders in people with and without history of driving accidents

Subjects	People with history of the driving crashes, n (%)	People without history of the driving crashes, n (%)	P^*
People with hypochondria	1 (20.0)	4 (80.0)	0.477
People with depression	10 (31.2)	22 (68.8)	0.002
People with hysteria	5 (27.8)	13 (72.2)	0.048
People with or social mental deviation	39 (72.2)	15 (27.8)	<0.001
People with paranoia	26 (23.9)	83 (76.1)	0.001
People with mental weakness	2 (18.2)	9 (81.8)	0.395
People with schizophrenia	14 (56.0)	11 (44.0)	<0.001
People with hypomania	3 (50.0)	3 (50.0)	0.030
People without mental disorders	56 (22.0)	410 (88.0)	-

The parameters of psychopathology are based on the MMPI questionnaire and its subscales. P^* shows the significance level of the types of mental disorders in people with and without history of driving accidents

Table 3: Statistical distribution of the types of mental disorders in people with history of different severities of the driving accidents

Parameters	People Without history of the driving crashes, n (%)	People With history of the Low severity driving crashes, n (%)	People With history of the medium severity driving crashes, n (%)	People With history of the high severity driving crashes, n (%)	P^*
People with hypochondria	4 (80.0)	0 (0.0)	0 (0.0)	1 (20.0)	0.471
People with depression	22 (68.6)	0 (0.0)	6 (18.7)	4 (12.6)	0.001
People with hysteria	13 (72.2)	0 (0.0)	5 (27.8)	0 (0.0)	0.047
People with or social mental deviation	15 (27.8)	1 (1.8)	21 (38.9)	17 (31.5)	0.001
People with paranoia	83 (76.1)	5 (4.6)	14 (12.8)	7 (6.4)	0.001
People with mental weakness	9 (81.8)	0 (0.0)	2 (18.2)	0 (0.0)	0.530
People with schizophrenia	11 (44.0)	0 (0.0)	8 (32.0)	6 (24.0)	<0.001
People with hypomania	3 (50.0)	0 (0.0)	3 (50.0)	0 (0.0)	0.005
People without mental disorder	410 (88.0)	1 (0.2)	55 (11.8)	0 (0.0)	-

The parameters of psychopathology are based on the MMPI questionnaire and its subscales. P^* shows the significance level of the types of mental disorders in people with history of different severities of the driving accidents

While comparing individuals with and without mental disorders, a significantly higher percentage of mental disorders was recognized in individuals with history of driving accidents than in people without history of driving accidents. However, age revealed no significant difference between the two groups. All the participants were men and had a non-addiction certificate. Therefore, based on our results and based on the inclusion criteria of the study, it can be said that, probably, the rate of accidents and its history in individuals are affected by their mental disorders.

The results of ketabi *et al.* study on the 300 truck drivers showed that the aberrant behaviors have the high frequency among truck drivers and the safety consciousness has not sufficiently developed in them, significantly leading road accidents and economic losses.^[24] These type of behaviors have various causes. So that, individual's characteristics, state of excitement, feeling, understanding, perceptual errors, interests and attitudes, social behaviors, and learning can each have a relation with the traffic behavior of truck drivers. One of the important causes is the lack of mental health. It can be said that mental and personality disorders are related to each other and have an effect on traffic problems.^[25] The effect of mental disorders on highly risky driving and accidents can be interpreted through the two mechanisms of attention and personality. Many studies show that a large number of the accidents in highways are caused by an inability to process information and a lack of or reduced attention. As such, driving or anchoring a vehicle depends on skills, judgment, and decision making, as well as the mental and physical state of the driver.^[26] The results of a study show that mental disorder and highly risky driving increase comprehension time and the driver's reaction time, including the interval between pictorial, voice or emotional stimulus of the traffic situation, and the first reaction. The raised reaction time is an important factor in highly risky driving and, therefore, accidents.^[19] The other mechanism is the effect of mental disorders on individual personality. Individuals who suffer from psychological problems have negative feelings such as excitement, stress, anger, guilt, and permanent and pervasive feeling of inadequate attention and lack of focus, which affect driving and are highly risky.^[19] Mohammadi *et al.*, in their study, show that the patients with psychological disorder have twice as many driving accidents.^[27] As well as, resulted by Hilton *et al.*, the severe mental health disorders such as depression impress on the driving performance of the heavy goods vehicles and enhance the statistics of the crashes.^[20] These results are consistent with the results of the present study. The results of an accurate analysis based on the different kinds of mental disorder also showed that mental disorders of depression, hysteria, mental social deviation, paranoia, schizophrenia, and hypomania in individuals with the history of driving accidents were significantly higher than those in persons without history of driving accidents. As well as, people with mental disorders reported higher and medium

driving accidents experience than individuals without the mentioned mental diseases and the number of low-severity accidents was low in these people. Among mental disorders, the social mental deviation is one of the important disorders and the results of the current study show that drivers with this disorder experience significantly more driving accidents. Individuals with antisocial mental diseases do not drive carefully and are a risk to themselves and others.^[28] Studies indicate that fast and risky driving and violating driving and guidance regulations are characteristics of individuals with antisocial personality disorders.^[25] Serious disturbance and risky and aggressive driving are clear deviations and are abnormal cultural models. Individuals with psychopathic personality disorders drive in a risky manner and cause accidents.^[29] In fact, these individuals have an aggressive, hostile, and unstable personality and are exposed to risk, aggressive driving, and damage in undesirable emotional conditions more than others. Inversen and Rundmo, in a study, concluded that drivers who have high scores in abnormality experience a higher number of driving accidents and are engaged more in highly risky driving.^[30] There are more studies that show the effects of other mental disorders on driving accidents. For instance, one study recognized that there is a meaningful difference between the average scores of paranoia thoughts dimensions, obsession and compulsion, sensitivity in interpersonal relation, and depression in two groups of drivers with and without a history of accidents.^[31] Alavi *et al.* show that depression and anxiety increase the chance of a driving accident by 3.6 and 2.6 times in truck drivers, respectively.^[32] Lam *et al.* demonstrated that the vehicle drivers with suicidal thoughts have an Odds Ratio of 4.2 for being involved in an accident.^[33] The results of a study show that mental depression, social personality disorder, negativism personality disorder, anxiety disorder, and mania scales in drivers with highly risky driving behavior have a significant difference than usual individuals. However, narcissism mental scales and paranoia do not lead to significant differences between the two groups.^[34] Based on these studies, it can be said that fast and risky driving and violating guidance and driving regulations are characteristics of individuals with mania and antisocial personality disorders.^[25] Most of these results correspond with the findings of the current study. The results of various studies show that drivers of heavy vehicles are subject to various mental disorders due to the mobile nature of the job. The results of an epidemiological study revealed that the prevalence of the mental disorders is between 19% and 30%.^[35] In addition, the results of a study performed by Shattell on 316 male truckers indicated that the prevalence of depression, anxiety, and other emotional problems are equal to 26.9%, 14.5%, and 13%, respectively.^[36] Given the obtained results, these disorders can lead to dangerous crashes.

In addition, the results of the current study showed that the mental disorders of hypochondria and mental

weaknesses in people with history of driving accidents were not significantly different from those in people without history of accidents. Maybe, it is because individuals with these types of mental diseases show a more conservative behavior in driving in order to get away from the stress of exciting behaviors and, thus, have a low history of driving accidents. However, the degree of mental disorders can be a predictor of driving accidents, though this study evaluated only the presence or absence of such diseases. Thus, it is proposed that the relationship between the degree of different mental disorders and the rate of a driving accident be evaluated in future studies, because these diseases have a high prevalence. The most important limitation of the present study was the absence of data that showed percentage of responsibility in accident, in other hand, when a driver who had an accident and he or she was responsible for it was another relative causes such as weather and Vehicle situation? We had not access to these data. Other limitation of the present study included low number of people with a history of driving accidents selected based on the inclusion and exclusion criteria compared to people without a history of driving accidents, non-investigation of the relationship between numbers of accidents and mental disorders, and non-investigation of the relationship between driving behaviors and mental disorders. Strength of the study also included investigation of the relationship between history and severity of driving accidents with the mental disorders evaluated by MMPI instruments, separately.

Conclusion

The results of the current study showed that generally, individuals with history of driving accidents had significantly more mental disorders than people without history of driving accidents. Only good vision cannot be a criterion for driving competence since experience, natural talents, caution, and mental balance can affect the competence for driving. Therefore, drivers, including truck drivers and drivers of other kinds of vehicles, need to be evaluated on these aspects while issuing a driving license using the determinant scales of personality disorders rate. This would lead to a reduced rate of driving accidents and safer driving behavior in the future.

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Conflicts of interest

There are no conflicts of interest.

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