

# Personality and Driving Behavior Among Patients with Traumatic Injury: A Comparison of Normal and Attention Deficit Hyperactivity Disorder Patients

Arash Mani<sup>1</sup>, Yasin Farshchi Tabrizi<sup>2</sup>, Rohallah Rostami<sup>3</sup>, Shahram Paydar<sup>4</sup> and Seyed Ali Dastgheib<sup>1\*</sup>

1. Research Center for Psychiatry and Behavior Sciences, Shiraz University of Medical Sciences, Shiraz, Iran

2. Department of Psychology, Payame Noor University, Bushehr, Iran

3. Department of Psychiatry, Shiraz University of Medical Sciences, Shiraz, Iran

4. Trauma Research Center, Shahid Rajaei (Emtiaz) Trauma Hospital, Shiraz University of Medical Sciences, Shiraz, Iran

## \* Corresponding author

**Seyed Ali Dastgheib, MD**

Research Center for Psychiatry and Behavior Science, Shiraz University of Medical Sciences, Shiraz, Iran

Tel: +98 71 36479319

Email: adastgheib@sums.ac.ir

**Received:** 25 Nov 2019

**Accepted:** 25 Jan 2020

## Citation to this article:

Mani A, Farshchi Tabrizi Y, Rostami R, Paydar Sh, Dastgheib SA. Personality and Driving Behavior Among Patients with Traumatic Injury: A Comparison of Normal and Attention Deficit Hyperactivity Disorder Patients. *J Iran Med Counc.* 2020;3(1):48-54.

## Abstract

**Background:** The purpose of this study was to assess the personality and driving behavior in normal and Attention Deficit Hyperactivity Disorder (ADHD) patients with traumatic injury admitted to Rajaei Hospital.

**Methods:** This study was conducted in 2013 at Shiraz Trauma Center. All patients with physical trauma who referred to Shahid Rajaei Hospital, Shiraz, Iran were included; 60 male subjects with or without ADHD symptoms were selected. Demographic factors were assessed by a self-report questionnaire and driving behavior and personality traits were assessed by Manchester driving behavior questionnaire (MDBQ) and Neo Five Factor Inventory (NEO\_FFI), respectively.

**Results:** Among 60 patients evaluated in this study, 29 males were diagnosed with ADHD and 31 were classified as non-ADHD group. There was a significant difference between ADHD and non-ADHD groups in the frequency of accidents ( $p < 0.001$ ), injury history ( $p < 0.003$ ), driving behavior ( $p < 0.01$ ), and personality ( $p < 0.05$ ). ADHDs had a higher mean score of neuroticism, extraversion, openness and agreeableness; in addition, ADHDs had more injuries and accidents.

**Conclusion:** It can be concluded that one of the main factors that cause riskier driving behaviors is EF and in conjunction with other comorbidities such as ADHD or personality disorders, it can increase risky driving behavior which can lead to more accidents and injuries.

**Keywords:** Accidents, Attention deficit hyperactivity disorder, Iran, Personality

## Introduction

Using transportation is one of the main needs of any society which leads to more usage of vehicles and accidents (1). Driving accidents is one of the most important causes of death worldwide, with 1.2 million people suffering from deaths or handicaps every year on road accidents (2). Results suggest that by 2020, the fatality of traffic accidents will have increased to 80% in low income countries and 30% in high income countries (3). Traffic accidents in Iran are the third leading cause of death (3,4).

Psychiatric disorders are one of the factors that can lead to major accidents. Disorders such as antisocial, borderline personality disorder, anxiety, depression and attention deficit hyperactivity disorder are the factors affecting risky behaviors (5,6). Attention Deficient Hyperactivity Disorder (ADHD) is a disorder that begins in childhood and is characterized by attention deficit and hyperactivity. ADHD may emerge in adulthood if not treated and affect cognition and executive function in that period of life (7). In children, attention increases the ability to identify the risks; however, this does not apply to adults (6). ADHDs are more likely to have a weaker performance keeping distance from other cars, drive more safely, and have more attention errors compared to healthy individuals or treated ADHDs. Additionally, ADHDs and treated ADHDs report more inappropriate driving behaviors (8). Risky behavior is an important component among ADHDs, which predicts error, slipping, and violations (9). Research suggests that ADHD is a disorder that can lead to more errors compared to others due to a lack of focus, attention and poor Executive Functioning (EF) (10-13).

Compared to other drivers, ADHDs are more likely to show careless driving behaviors, violations such as not using a seatbelt, driving with no hands or searching for an object while driving. Additionally, they make more mistakes than other groups (8,12). One of the reasons that leads to more accidents is lack of attention, delay in reaction, and errors in executive functions. In addition, Qu *et al* (14) found that pedestrian's inappropriate behaviors have a significant relationship with errors related to attention; also, some personality traits such as antisocial behaviors and norm breaking can predict the pedestrians' aggressive behaviors.

Another factor affecting the traffic accidents is personality traits. Personality can be one of the most important factors that have an impact on driving behavior (14-16). Buchanan found a correlation between executive function and personality traits such as neuroticism and conscientiousness (17). Sensation seeking may lead to riskier behaviors while driving (14-16). Generally, ADHDs have higher novelty seeking score (18,19). Novelty is a variable associated with antisocial personality disorder, depression, anxiety and alcohol abuse (19). Sex had a significant correlation with ADHD, anxiety and antisocial personality disorder although this result was not included for males. Inattentiveness in ADHD negatively correlated with conscientiousness and extraversion. Also, ADHDs with attention defects and impulsivity are both associated with neuroticism (20). However, studies have shown that personality traits impact and predict risky behaviors (21). Those with higher score of neuroticism were more probable to have an accident and higher scores in conscientiousness and agreeableness predicted fewer accidents (22,23).

Studies suggest that car accidents and related injuries are associated with ADHD, and these individuals have riskier behaviors and accidents than others (12,24-26). Although ADHD can be the cause of other types of injuries, such as burns, *etc.* (9), these accidents can be due to the lack of attention and poor EF in such patients, which could affect the adolescents' social performance. Since several personality traits are associated with driving behavior, in this study, an attempt was made to assess both driving behaviors and personality traits in ADHD patients.

## Materials and Methods

This was a case control study. Participants were all male which were selected via convenience sampling among patients who referred to Shahid Rajaei Hospital affiliated to Shiraz University of Medical Sciences due to any type of bodily trauma, except for brain injury, confirmed by the surgeon participating in the study. According to psychiatric evaluation, the participants were divided into two groups: (1) ADHD: 29 male adults with a mean age of  $27.16 \pm 5.60$  years who were clinically diagnosed for adult ADHD according to structured interview with bodily trauma; (2) clinical

control group: 31 male adults with a mean age of 26±3.47 years evaluated by clinicians who, had no sign of ADHD and only had a history of recent trauma.

Former group fulfilled inclusion criteria such as being diagnosed as an ADHD, experiencing a bodily trauma during a car accident showing no sign of brain injury, having the lowest level of primary education and no history of major psychiatric problems. Control group also fulfilled these criteria except for the ADHD diagnosis.

The present study was approved by ethics committee of Shiraz University of Medical Sciences and verbal informed consent was obtained, and the participants were ensured of the confidentiality. After that, they completed NEO Five Factor Inventory and Manchester driving behavior questionnaires.

### Tools and measurements

**Neo Five Factor Inventory (NEO\_FFI):** This 60 item inventory short form of NEO personality inventory evaluated five personality traits in patients. Dimensions were scored in five point Likert scale from 0 to 4. These dimensions include neuroticism, extraversion, openness to experience, agreeableness and consciousness; each domain has 12 items, so the expected score range is from 0 to 4. An acceptable level of reliability and validity was reported for the Farsi version of the test (27).

**Manchester Driving Behavior Questionnaire (MDBQ):** This 50 item questionnaire evaluated 4 domains of violation and errors while driving in 6 point Likert scale from 0 to 5. According to a pervious study, MDBQ has acceptable psychometric

characteristics in Persian and all four factors showed an internal consistency between.65 to.86. These domains are slip: 0.77, mistakes: 0.81, intentional violation: 0.86, and unintentional violation: 0.65 (11).

### Statistical analysis

All collected data were analyzed through IBM SPSS statistics 19, using descriptive statistics (Mean±SD), chi square and independent sample t-test. P value less than .05 was considered significant. Before executing t-test, Kolmogorov-Smirnov was conducted to assess the normal distribution for data in which none of the variables' Z values were significant, indicating all the variables were normally distributed.

### Results

The present study was conducted on 29 male adults with a mean age of 27 years who were clinically adult ADHDs according to structured interview with physical trauma and 31 male adults with a mean age of 26 years who were evaluated by some clinicians and had no sign of ADHD and only had a history of recent trauma. There was no significant difference between age and years of driving between the two groups. Participants had primary education with no history of psychiatric disorders and no evidence of brain damage.

According to table 1, there were significant differences between ADHD and non-ADHD groups in the frequency of accident and injury history. According to the results, history of accident and injury was significantly prevalent among ADHD group rather than non-ADHD.

**Table 1.** Frequency of accident and injury among ADHD and non-ADHD groups

		Group		Sig
		ADHD f (f%)	Non ADHD f (f%)	
Number of previous accidents	0	0 (0)	2 (7.1)	0.001
	1	3 (10.7)	15 (53.6)	
	2	4 (14.3)	9 (32.1)	
	3	7 (25.0)	0 (0)	
	4	5 (17.9)	1 (3.6)	
	5	5 (17.9)	0 (0)	
History of injuries frequency	6≥	4 (14.4)	1 (3.6)	0.003
	1	10(33.3)	22 (75.9)	
	2	9 (30.0)	7 (24.1)	
	3	6 (20.0)	0 (0)	
	4	4 (13.3)	0 (0)	
	5≥	1 (3.3)	0 (0)	

It can be concluded that there is a significant difference between non-ADHD and ADHD groups (ADHD and non-ADHD patients) in all of the subscales of personality and driving behavior.

ADHDs had a higher mean score in agreeableness, openness, extraversion and neuroticism although in non-ADHDs, conscientiousness had a higher mean score. In driving behaviors, ADHDs had a higher mean in errors, slip and deliberate violations, and non-ADHD patients had higher scores in unintentional violation (Table 2).

## Discussion

The purpose of this study was to investigate and compare the driving behavior of ADHD and non-ADHD individuals and their personality traits. Accordingly, the main finding showed that personality dimensions and driving behaviors indicated a significant difference between ADHDs and non-ADHDs, assuming the groups had no difference in terms of age, years of driving, psychiatry disorders and education. This result can be explicated in the light of previous research.

Randell *et al* found that there was a significant difference between two experimental and control

groups regarding the components of the slips, violations, errors and the overall score of driving behavior, which is consistent with our results and findings (8). The control group and treated ADHD showed safer behaviors while driving, identifying risks earlier than the ADHD group. Untreated ADHDs made more mistakes and attention errors compared to the treated ADHD group and controls; delay in risk perception could be a result of their attentional problems (8). ADHDs have more difficulties in safe traffic behaviors and commit attentional errors compared to controls and treated ADHDs. In summary, ADHDs and treated ADHDs report poorer driving behaviors (8). Also, ADHDs commit riskier behaviors that can predict errors, slipping, and violations (9) and these behaviors can be continued in adulthood in many ADHDs (7,28). Accordingly, the present study illustrates that adult ADHDs have a higher mean score in driving behavior subscales which is significant, showing the malfunction in ADHD patients, which is in line with other researches. In addition, our results illustrated that ADHDs showed a higher mean score in agreeableness, openness, extraversion, and neuroticism and non-ADHDs had a higher mean score in conscientiousness. Other

**Table 2.** Comparison of personality and driving behavior between groups

	Group	Mean ± SD	Significance
Personality	ADHD	5.07±26.96	0.001
	Non-ADHD	5.18±33.86	
	ADHD	4.92±22.19	0.001
	Non-ADHD	3.75±28.58	
	ADHD	3.51±28.58	0.047
	Non-ADHD	3.43±26.75	
Driving behavior	ADHD	5.68±26.32	0.001
	Non-ADHD	3.54±30.82	
	ADHD	6.27±29	0.001
	Non-ADHD	4.96±21.89	
	ADHD	16.19±38.67	0.001
	Non-ADHD	12.17±14.96	
Driving behavior	ADHD	14.57±30.92	0.001
	Non-ADHD	11.59±13.76	
	ADHD	7.023±15.07	0.001
	Non-ADHD	4.95±5.69	
Driving behavior	ADHD	2.92±5.46	0.006
	Non-ADHD	2.97±3.15	

researches indicate that ADHDs represent a high level of comorbidity with personality disorders (5); their neuroticism score is highly significant although their conscientiousness score is low, indicating these results are consistent with those of the current study (18). Also, female ADHDs are more likely to have a higher score in neuroticism, openness to experience, agreeableness, and avoidance of harm compared to males (18). ADHDs proved a significantly negative relationship between conscientiousness and extroversion. However, this connection is more strongly related to the extraversion factor (20). Inattention in ADHDs is negatively correlated with conscientiousness and extroversion. However, inattention and impulsiveness in ADHDs are both associated with neuroticism (20). Being ADHD in adulthood has a significant relationship with impulsivity (18). ADHD comorbidities with personality disorders encompass high levels of harm avoidance and sensation seeking (20). In another study (29), the ADHD group demonstrated distinct personality and behavioral characteristics of their own, including novelty seeking, high-risk behaviors, inappropriate and high-risk decisions. Among the reasons which led to accidents, attention deficiency, slowness and errors in executive tasks were more prominent (28).

Research indicated that individuals with higher conscientiousness and extraversion were less likely to be faced with accidents; higher conscientiousness and lower agreeableness are related to less risky driving behavior; also, agreeableness and neuroticism had a significant correlation with driving accidents (22,23). Higher levels of openness and conscientiousness predicted texting more by teens; however, lower levels of agreeableness predicted less interaction with phone and texting while driving (30). These results, though inconsistent, indicate that personality traits like neuroticism and agreeableness in ADHDs are more prone to an accident, while conscientiousness illustrated opposite relationship in comparison to former personality components mentioned before.

According to the results, the frequency of ADHD participants increases with frequency of accidents. More frequency in accidents correlates with more injuries in ADHDs; however, contrasting results and negative correlation were found in non-ADHDs. This finding suggests that ADHD individuals are more

likely to have accidents and injuries; this finding is in line with other studies (31,32). In general, individuals with ADHD are more likely to have minor accidents (12). They appear to be more likely to commit offences such as driving without seat belt and unusual driving behaviors (8,9,12). In a meta-analysis, it was found that ADHD patients are more likely to suffer from injuries and accidents. However, in another study, an inconsistent result was found rejecting the prevalent claim about the high incidence of accidents and injuries in ADHD patients. Another claim is that ADHD comorbidities in tandem with other disorders, such as ODD or CD, can account for more accidents; also, ADHDs' violations are more likely to be unauthorized and the frequency of other careless behaviors is the same in both normal individuals and ADHDs (5).

## Conclusion

It can be concluded that one of the main factors that cause riskier driving behaviors is EF and in conjunction with other comorbidities such as ADHD or personality disorders, it can increase risky driving behavior which can lead to more accidents and injuries. All in all, ADHD is a disorder with poor EF, which is an important component for better human functions in the social life. Some parts of this function are related to traffic behaviors, so it would be useful to investigate this subject by conducting further studies. One of the limitations of this paper was lack of conducting follow up procedure. Also, there was not any restricted criterion in assessing the severity of patients' physical trauma.

## Acknowledgments

The present article was extracted from the thesis written by R. Rostami as a part of his activity for the degree of Master of Clinical Psychology, and financially supported by a grant (No. 92-6553) from Shiraz University of Medical Sciences. The authors would like to thank Shiraz University of Medical Sciences, Shiraz, Iran and also Center for Development of Clinical Research of Nemazee Hospital and Dr. Nasrin Shokrpour for editorial assistance.

## Conflict of Interest

The authors have no conflicts of interest.

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