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### Driving Behaviors and the Influential Factors in the Taxi Drivers in Isfahan City, Iran (2017)



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#### ABSTRACT

**Background:** Given the importance of road accidents as a major cause of mortality and disability, the present study aimed to assess the driving behaviors and their influential factors in the taxi drivers in Isfahan city, Iran in 2017.

**Methods:** This cross-sectional study was conducted on 200 taxi drivers, who were randomly selected from various urban taxi lines. Data were collected using Manchester driver behavior questionnaire. Data analysis was performed in SPSS version 20 using t-test and one-way analysis of variance (ANOVA).

**Results:** The mean scores of intentional violations, driving slips, driving mistakes, and unintentional violations were  $10.26 \pm 30.10$ ,  $8.39 \pm 33.99$ ,  $3.71 \pm 12.28$ , and  $1.87 \pm 5.14$ , respectively. Intentional violations and driving slips were associated with the highest driving risks. The most unsafe driving behavior was overtaking from a slow-driving driver, and unsafe driving was mainly observed in the youth, educated drivers, and those driving for long hours daily.

**Conclusion:** According to the results, the taxi drivers in Isfahan city had high-risk driving behaviors in terms of intentional violations and driving slips. Therefore, it is recommended that related workshops be held to promote healthy driving in taxi drivers.

### 1. Introduction

The mortality, injuries, and disabilities that are caused by road accidents are considered to be major health concerns in every community, and road accidents are among the foremost causes of death, disability, and hospitalization, leading to prominent economic and social problems [1].

According to the report by the World Health Organization (WHO) in 2015, over 1.25 million people in the world die every year due to road accidents [2]. Traffic accidents are regarded as the eighth major cause of mortality in the world [3], and the injuries caused by road accidents are considered lead to the death of the individuals aged 15-44 years [4].

Road accidents and the subsequent injuries are reported to be among the main causes of death and disability in low-income countries is expected to rank these countries fifth in the world in terms of the mortality rate of traffic accidents by 2030 [3].

Evidence suggests that the overall rate of the injuries caused by road accidents is on the rise across the world. Previous studies have indicated that if this trend continues until 2020, the mortality rate of road accidents will reach 85% in middle- and low-income countries [5].

Iran has been reported to have one of the highest rates of mortality due to road accidents in the world.

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Road accidents in Iran are the second cause of mortality and disability after cardiovascular diseases. Based on the records published in 2013-2014, the report by the WHO showed that on average, 23 out of 100,000 individuals die due to road accidents in Iran each year [2]. Furthermore, road accidents account for the highest rate of diseases in Iran and are considered to be the first cause of mortality in the individuals aged less than 40 years [6].

Although road accidents have had a declining trend in recent years, and the trend has continued so far, the number of the individuals that are killed in car crashed remains high. This issue requires extensive interventions for the effective reduction of these adverse events [6].

In Iran, there are several busy and industrial cities, one of these centers of Isfahan stste. Since Isfahan stste is one of the first four stste of the country in categorizing fatal accidents. The city of Isfahan as the capital of the stste has the highest percentage of accidents in the province [7].

Although road and vehicle safety play a key role in reducing the mortality rate of traffic accidents, several studies have denoted behavioral human factors to be the main influential factor in 90-95% of road accidents. As such, proper instructions for the modification or improvement of these factors are among the most effective approaches to the reduction of road accidents [8].

Driving behaviors refer to the behaviors selected by drivers, which form their driving pattern; such examples are the driving speed, concentration while driving, and keeping the standard distance with the front vehicle. Driving behaviors are classified into four main categories, including driving slips, intentional violations, driving mistakes, and unintentional violations [5]. These behaviors are continuously adopted by drivers and could change similar to the other health behaviors in humans. However, the first step in this regard is to alter the perceptions toward these behaviors, as well as their influential factors.

Taxi drivers select driving as a profession and are considered an important population as they constantly deal with driving and its associated behaviors. The risk of unsafe driving behaviors tends to be higher in taxi drivers compared to other populations. For instance, a study conducted on the taxi drivers in Ahvaz (Iran) indicated that the driving behaviors of the participants were among the major causes of traffic accidents in the city [9].

Previous studies have analyzed the behaviors of drivers, and the results have shown direct associations between personality, high-risk driving, and accidental conflicts with road accidents [10,11].

However, the literature search revealed no studies focusing on the driving behaviors of the taxi drivers in Isfahan city, Iran. Since Isfahan is a metropolitan city in Iran, where transportations largely depend on taxis, evaluation of the driving behaviors in the taxi drivers in this city could contribute to the reduction of road accidents. On the other

hand, cultural practices could be promoted in the community in order to improve the driving behaviors in other individuals. The present study aimed to assess the driving behaviors and their influential factors in the taxi drivers in Isfahan, Iran in 2017.

## 2. Materials and Methods

### 2.1. Study Design

This cross-sectional study was conducted in Isfahan city in 2017. The participants were selected via simple random sampling from the taxi drivers of various urban taxi lines. The sample size was estimated at 186 using the sample size formula at 0.95 confidence level based on similar studies (200 drivers considering exclusions) [12].

### 2.2. Study Population and Sampling Method

The sample population consisted of taxi drivers who were selected via stratified sampling, and the available research samples in each category were enrolled in the study based on the inclusion criteria, including the age of more than 20 years, a minimum of second-grade driver's license, and driving at least once a week.

### 2.3. Research Instrument

Data were collected using the Manchester driver behavior questionnaire (MDBQ) to assess the driving behaviors. MDBQ has been developed in Manchester University (United Kingdom) by Reason et al. and used in various countries, including England, Australia, and Finland [13]. The validity and reliability of this instrument have been confirmed. The Iranian version of MDBQ has also been validated by Alavi et al. (2016) and its reliability has been confirmed in various sections [14].

MDBQ consists of two sections, including demographic data and Manchester driving behaviors. The first section has 14 items on demographic characteristics, including age, marital status, driving experience, number of accidents, and being guilty for accidents. The second section has five items on driving behaviors with four subsections, including driving slips (20 items), intentional violations (18 items), unintentional violations (three items), and driving mistakes (nine items). The items in MDBQ are scored based on a six-point Likert scale (Never, Rarely, Sometimes, Most Often, Frequently, and Always).

The items in MDBQ are analyzed based on the type of driving behaviors and rate of the risks of the drivers' behaviors posed to others. Abnormal driving behaviors are divided into four categories, including driving slips, driving mistakes, intentional violations, and unintentional violations.

### 2.4. Ethical Considerations

After obtaining the required permit and ethical code of the research from Isfahan University of Medical Sciences in Isfahan, Iran (code: 196108), the questionnaires were provided to the selected participants in Isfahan city by referring to taxi stations.

After explaining the research objectives to the participants and obtaining informed consent, the self-administrated questionnaires were completed. In addition, the participants were assured of confidentially terms regarding their information.

### 2.5. Statistical Analysis

Data analysis was performed in SPSS version 20, and the normality of the data was assessed. Descriptive statistics (e.g., frequency for demographic data) and analytical statistics (t-test and one-way analysis of variance [ANOVA]) were used for the comparison of the driving behaviors with other variables. Two-tailed *P*-value of less than 0.05 was considered statistically significant.

## 3. Results and Discussion

In total, 200 male taxi drivers with the mean age of  $41.59 \pm 12.74$  years (age range: 20-53 years) were enrolled in the study. Regarding the education level, eight participants (4%) were illiterate, 54 drivers (27%) had primary/secondary education, 75 drivers (37.5%) had high school diploma, 51 drivers (25.5%) had an associate degree, and 12 participants (6%) had a bachelor's degree (or higher).

The mean age of receiving the driver's license was  $22.22 \pm 5.9$  years, the mean driving experience was  $76.84 \pm 19.11$  years, and the mean length of driving per day was  $9.44 \pm 6.43$  hours (Table 1).

Table 2 shows the data regarding the driving behaviors, which were categorized as driving slips, intentional violations, unintentional violations, and driving mistakes based on the MDBQ.

The results of t-test and ANOVA indicated an inverse, significant correlations between driving slips, intentional violations, and unintentional violations with the education level of the taxi drivers ( $P = 0.045$ ), while the rate of the driving mistakes was higher in the participants with higher education levels ( $P = 0.05$ ). However, no significant associations were observed between driving slips, driving mistakes, and unintentional violations with occupation status, while a significant correlation was denoted between intentional violations and occupation status ( $P = 0.022$ ). The findings also showed a significant correlation between driving slips and length of driving per day ( $P = 0.001$ ).

Regarding the frequency distribution, the behaviors in each subsection were assessed, and driving slips were reported in 70 participants (35%), who were distracted during driving by various activities (e.g., changing the radio waves or listening to music).

In terms of intentional violations, 42 participants (21%) stated that they were frustrated by the low speed of a driver and intended to overtake their vehicle. As for driving mistakes, six participants (3%) were reported to drive at night frequently in suburban roads with their vehicle lights off. With respect to unintentional violations, 13 drivers (6.5%) claimed that they were unaware that their speed was exceeding the permissible limit.

**Table1:** Demographic characteristics of study participants according to number of driving accident

| Variables                   | Accident times during recent two years |                   |                   | P value           |       |
|-----------------------------|--|-------------------|-------------------|-------------------|-------|
|                             | Never                                  | 1or 2 times       | 3times &more      |                   |       |
| Age                         | mean $\pm$ SD                          | 40.96 $\pm$ 12.03 | 40.83 $\pm$ 13.23 | 51.92 $\pm$ 11.75 | 0.014 |
| Age (N (%))                 | 18 years old                           | 58 (77.3)         | 15 (20)           | 2 (2.7)           |       |
|                             | 19-30 years old                        | 71 (65.1)         | 30 (27.5)         | 8 (7.3)           |       |
|                             | 30-40 years old                        | 10 (83.3)         | 0 (0)             | 2 (16.7)          |       |
|                             | > 40 years old                         | 2 (66.7)          | 2 (33.3)          | 0 (0)             |       |
| Education level (N (%))     | Illiterate                             | 5 (62.5)          | 1 (12.5)          | 2 (25)            | 0.292 |
|                             | Less than diploma                      | 34 (63)           | 2 (16.7)          | 0 (0)             |       |
|                             | Diploma                                | 56 (74.7)         | 14 (18.7)         | 5 (6.7)           |       |
|                             | BSc                                    | 37 (72.5)         | 13 (25.5)         | 1 (2)             |       |
|                             | License & more                         | 10 (83.3)         | 2 (16.7)          | 0 (0)             |       |
| Job (N (%))                 | Unemployed                             | 15 (65.2)         | 8 (34.8)          | 0 (0)             | 0.012 |
|                             | Worker                                 | 10 (66.7)         | 2 (13.3)          | 3 (20)            |       |
|                             | Employee                               | 36 (83.7)         | 7 (16.3)          | 0 (0)             |       |
|                             | Retired                                | 20 (60.6)         | 8 (24.2)          | 5 (15.2)          |       |
|                             | self-employment                        | 44 (72.1)         | 13 (21.3)         | 4 (6.6)           |       |
|                             | others                                 | 17 (68)           | 8 (32)            | 0 (0)             |       |
| Driving experience in years | < 2 years                              | 0 (0)             | 1 (100)           | 0 (0)             |       |
|                             | 2-5 years                              | 8 (53.3)          | 7 (46.7)          | 0 (0)             |       |
|                             | 5-10 years                             | 29 (76.3)         | 8 (21.1)          | 1 (2.6)           |       |
|                             | 10 years or more                       | 105 (71.9)        | 30 (20.5)         | 11 (7.5)          |       |
| Driving hours               | < 8 hours                              | 78 (82.1)         | 14 (14.7)         | 3 (3.2)           | 0.023 |
|                             | 8-14 hours                             | 52 (61.2)         | 26 (30.6)         | 7 (8.2)           |       |
|                             | 14 hours or more                       | 12 (60)           | 6 (30)            | 2 (10)            |       |

**Table 2:** The mean (SD) of driving behaviors in taxi drivers

| Variables              | Mean ± SD     | Min | Max |
|------------------------|---------------|-----|-----|
| Slips                  | 8.39 ± 33.99  | 20  | 61  |
| Intentional violations | 10.26 ± 30.10 | 18  | 74  |
| Mistakes               | 3.71 ± 12.28  | 8   | 33  |
| Unintentional          | 1.87 ± 5.14   | 3   | 13  |

The present study aimed to assess driving behaviors in taxi drivers. According to the findings, the most common influential factors in driving behaviors that led to road accidents were intentional violations (98%), driving slips (92.5%), driving mistakes (14%), and unintentional violations (12.5%). In another research in this regard, Pourmirza Kalhori et al. (2014) evaluated the driving behaviors of the personnel of a medical emergency department in Kermanshah (Iran), the most important influential factor in road accidents was driving slips (92%), followed by intentional violations (91%) [15].

According to the study by Tavakoli et al. (2016), on the city drivers in Iran, approximately 76% of the participants had unintentional violations, while 72% had intentional violations [16].

Regarding the intentional violations in driving, the highest rate in the present study belonged to unauthorized overtaking from a frustrating driver. As for driving slips, the highest rate belonged to the distractions during driving due to other activities (e.g., changing the radio waves or listening to music). In the study by Pourmirza Kalhori et al. (2014), the highest rate of driving slips was associated with attention to the traffic in the opposite direction and paying no attention to the front vehicle. In terms of intentional violations, the highest rate in the current research belonged to aversion from some drivers and indicating enmity to those drivers [15].

The findings of the current research showed the control of excitement and interpersonal interactions in the taxi drivers in Isfahan. However, since impatience and frustration in driving was highly common, it is essential that educational programs on patience and tolerance be implemented for the taxi drivers in this city. In the study by Oreyzi and Haghayegh (2010) in Isfahan (Iran), the psychological characteristics of the drivers in Isfahan were investigated, and the highest rate of driving slips was associated with forgetting the appropriate gear while driving. In addition, the highest rate of intentional violations was associated with the improper conditions in driving due to medical limitations [17].

Therefore, it could be inferred that the main difference between the taxi drivers in Isfahan and other drivers in terms of intentional violations and driving slips is that the former spend long hours on driving, which gives rise to fatigue, thereby leading to unauthorized overtaking and low tolerance, as well as doing other activities (e.g., listening to the radio or music) while driving in order to deal with fatigue.

Driving mistakes was the third important influential factor in driving behaviors in the present study. Our findings in this regard are consistent with the study by Pourmirza Kalhori et al. (2014), in Kermanshah (Iran) [15]. It is notable that these mistakes were due to high-speed driving at night while the

vehicle lights were off in suburban roads. In this regard, the findings of Pourmirza Kalhori et al. (2014) indicated the highest rate of driving mistakes to be associated with the wrong estimation of the distance with the passing vehicles from the left side and the subsequent dangerous conditions [15]. The high rate of driving mistakes in the taxi drivers in Isfahan could be due to inappropriate road control outside the city by the police force or controlling cameras. In this regard, some foreign studies have reported that the main influential factor in driving mistakes is the improper use of devices while driving (e.g., turning on the screen wiper instead of using the lights or not adjusting the mirror for the rear view), which is inconsistent with the present study [8, 18].

In the current research, unintentional violations were the fourth influential factor in driving behaviors, which were related to distractions and not considering the high speed while driving. This finding is in line with the study by Oreyzi and Haghayegh, which was also conducted in Isfahan [17].

Therefore, it could be inferred that the non-observance of the authorized speed in Isfahan is the main cause of many accidents in this city. In the study by Pourmirza Kalhori et al. (2014), in Kermanshah, the highest rate of unintentional violations was associated with distractions and not paying attention to the pedestrians in zebra crossings or the vehicles crossing a red traffic light [15].

The differences in the influential factors in driving behaviors in the taxi drivers in Isfahan with other drivers indicated the difference in the driving patterns and risk admission by the taxi drivers in Isfahan compared to other cities or even other countries. This has been pinpointed in previous studies as well [18, 19].

The statistical analysis of the findings in the current research indicated inverse, significant correlations between driving slips, intentional violations, and unintentional violations with the education level of the taxi drivers ( $P < 0.045$ ), while the rate of driving mistakes was observed to be higher in the individuals with higher education levels ( $P = 0.05$ ). According to the study by HaghShenas et al. (2008) which was conducted in Shiraz (Iran) on male and female drivers, education level had a significant, direct correlation with the rate of driving mistakes. In other words, the drivers with higher education levels had higher rates of unauthorized actions and mistakes in driving [20]. On the other hand, the study by Hemenway and Solnick (1993), which was performed on the drivers in south California (United States), indicated that the drivers with higher education levels than high school had astonishingly more experience of accidents and non-observance of the authorized speed compared to the drivers with lower education levels than high school [21]. However, this finding is inconsistent with the present study as the number of the accidents was observed to decrease within the past two years in the drivers with higher education. The study by Shinar et al. (2001) confirmed that the observance of some safety principles reduced in the drivers with higher education levels [22]. Our findings are inconsistent with the study by Soltani et al. (2013), in Isfahan, which reported no

significant correlation between education level and other variables [23].

#### 4. Conclusion

According to the results, the taxi drivers in Isfahan city had high-risk driving behaviors in terms of intentional violations and driving slips. Considering the sensitive occupation of these individuals and the adverse effects on the health of passengers and other drivers, it is recommended that the ability for safe driving be enhanced in taxi drivers by implementing related workshops on driving instructions and safe driving.

#### Authors' Contributions

A.P. and Z.M., conceptualization and study design; Z.M., methodology and field work; A.P., data analysis; A.P. and Z.M., drafting of the manuscript; and A.P. and Z.M., visualization, supervision, and funding acquisition.

#### Conflict of Interest

The authors report no conflict of interest.

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#### Limitations

The present study is only done on the taxi drivers in the Isfahan city. Thus, it is proposed that this study to also be done on the out of-city drivers as well as female drivers for more effective comparisons regarding the intervention programs.

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