Traffic Accidents and Health of the Driver
Azam Saei,1,2 Ali Rahmani,1,2,* Abbas Ebadi,3 Hosein Mahmoudi,1,2 Masoud Sirati Nir,2 and Hamid Reza Khankeh4

1Trauma Research Center, Baqiyatallah University of Medical Sciences, Tehran, Iran
2Faculty of Nursing, Trauma Research Center, Baqiyatallah University of Medical Sciences, Tehran, Iran
3Behavioral Sciences Research Center, Faculty of Nursing, Baqiyatallah University of Medical Sciences, Tehran, IR Iran
4Division of Social Medicine, Department of Public Health Sciences, Karolinska Institutet, Norrbacka, SE-171 76, Stockholm, Sweden

*Corresponding author: Ali Rahmani, Trauma Research Center, Faculty of Nursing, Baqiyatallah University of Medical Sciences, Tehran, IR Iran. Tel: +98-91233406780, E-mail: rahmani444@gmail.com

Received 2017 May 10; Accepted 2017 September 05.

Abstract
Background: Most traffic accidents occur as a result of human factors. The drivers’ physical health is one aspect of the human factors. In order to assess the drivers’ health status, valid screening tools are needed.

Objectives: The purpose of this study was to translate the Driver Medical Questionnaire (DMQ) into Persian and evaluate its psychometric properties.

Patients and Methods: This was a descriptive/methodological study. The DMQ was translated from English into Persian by using the standard forward-backward translation technique. The face validity of the questionnaire was assessed using the comments of several drivers and military doctors. The reliability of the questionnaire was evaluated for internal consistency analysis using the Kuder-Richardson 21 formula as well as test-retest reliability assessment using the intraclass correlation coefficient calculation techniques. A total of 45 traffic offenders were invited to complete the pilot version of the Persian DMQ twice with a 14-day interval. Finally, the health status of 360 traffic offenders was evaluated by using the final version of the Persian DMQ.

Results: The questionnaire yielded a Kuder-Richardson 21 value of 0.68, while the intraclass correlation coefficient was 0.94. Approximately half (51.1%) of the participants had no health problem, 38.1% had 1 health problem, and 10.8% had 2 or more health problems. The latter group needed referrals to occupational medicine specialists. The Drivers’ health status was significantly associated with a history of accidents in the past 3 years (P = 0.01) and a history of injury-associated accidents (P = 0.001).

Conclusions: The Persian version of the Driver Medical Questionnaire (PDMQ) can be used as a valid and reliable tool for the screening of drivers’ health problems. Primary prevention and health promotion could have an important role in injury prevention and reduce the rate of traffic accidents.

Keywords: Driver Medical Questionnaire, Drivers, Traffic Accidents, Psychometric Evaluation

1. Background

Globally, traffic accidents are major health problems. Each year, between 20 and 50 million people are injured in accidents around the world, with 1.2 million deaths as a result of these injuries. Road traffic injuries are the number one cause of deaths among those aged 15 - 29, who are the most effective population in a society’s financial development (1). Studies have predicted that between the year 2000 and 2020, the number of accident victims will decreases in developed countries and increases in low as well as middle-income countries. Consequently, it is estimated that traffic accidents, which are currently the leading cause of deaths and injury will become the 3rd leading cause of death and injury by 2020 (2). Recently, there has been a rapid increase in motor vehicle use in many parts of the world, making transport-related injuries (TRIs) the dominant mechanism of trauma in most parts of the world (3). TRIs are a major public health problem worldwide (4). The global rank of our country, Iran, for accident-related mortality rate, is 8, while its rank in the Eastern Mediterranean Region is 2, second only to Libya. The rate of traffic accidents in Iran is 15 times higher than in developed countries (5) and hence, such accidents are a major health problem in Iran (6).

It has been estimated that 90% - 95% of all traffic accidents are caused by human factors. Human factors include physical, psychological, social, and cultural factors (7, 8). Physical factors significantly affect drivers’ performance and the risk of accidents (9, 10). Some physical factors and illnesses, which contribute to the incidence and the severity of traffic accidents include older (over 55) or younger (under 20) ages (11-13), medications (12), fatigue...
and sleepiness (14), obesity (15), as well as chronic condi-
tions such as sleep apnea (16) and depression (17). On the
other hand, considerable stress and immobility also pre-
dispose drivers to develop diabetes mellitus (18, 19) and car-
diovascular disease, which can accelerate their mortality
rate and affect the incidence of traffic accidents (20). Addi-
tionally, addictive substances, alcoholic drinks, and med-
ications have been known to affect drivers’ performance
and the rate of traffic accidents (21). Major physical health
problems can also affect the drivers’ cognitive function.
Consequently, drivers need to be physically, mentally, and
psychologically competent (22).

One of the key prerequisites to the effective manage-
ment of drivers’ health problems is to assess and identify
the problems through adopting screening procedures. Ac-
cording to Leproust et al. (2008), screening can help read-
ily identify many physical health problems among drivers
(3). One component of successful screening is the use of
valid screening tools (23). Currently, the screening proce-
dures for assessing the health status of drivers license ap-
plicants in Iran are performed neither comprehensively
nor by using valid tools. Instead, limited examinations,
such as visual acuity assessment, are made and done occa-
sionally. Two questionnaires are used to assess the health
status of driving license applicants and perform periodical
examinations for professional drivers. They include the Ep-
worth Sleepiness Scale and the Stop Bangs Questionnaire.
The Epworth Sleepiness Scale only assesses the subjective
sleepiness state (24) and the Stop Bangs Questionnaire as-
esses obstructive sleep apnea (25). However, screening
tools for assessing drivers’ health status need to be as com-
prehensive as possible and cover all aspects of physical
health, which can contribute to accidents (22, 26).

One of the screening tools for identifying drivers li-
cense applicants’ health problems is the Driver Medical
Questionnaire (DMQ). The DMQ is a simple, short, and
easily-applicable instrument, which assesses the most sig-
nificant physical and mental health problems affecting
traffic accidents in all ages. Yet it’s Persian translation has
not yet been confirmed. Its reliability and validity has not
been tested in Iranian patients. The aim of this study was
to translate the DMQ into Persian and evaluate its psycho-
metric properties.

2. Objectives

A) Reveal the inter-rater reliability for test replicability
(test-retest and Kuder-Richardson); B) Determine the inter-
nal consistency for PDMQ.

3. Methods

3.1. Design

This descriptive/methodological study was conducted
on 360 traffic offenders whose cars had been seized by po-
lice between March 2015 and March 2016 and recruited from
Tehran, Iran.

3.2. Instrument

The study instrument was the DMQ. This questionnaire
was developed by David Shackleton in Occupation Health
Solution, England, for the screening of drivers’ health
problems. The questionnaire was drafted in 1999 and re-
vised in 2001, 2011, 2013, and 2014. The most recent ver-
sion of the questionnaire was published in March 2014 (23).
The DMQ contains 17 short items, which monitor the pre-

sence of different physical and mental health problems as
well as medication used among drivers. The items screen
for problems such as visual impairment, difficulty seeing
well enough, epilepsy, attacks of dizziness or vertigo, weak-
ness or numbness, severe head injuries or brain surgeries,
hearing problems, disorders of the neck and the back, his-
tory of cancer, diabetes mellitus, cardiovascular disease,
abnormal heart rate or rhythm, hypertension, psychiatric
disorders, dependence on or abuse of drugs, alcohol, or
other substances, the history of using medications that
negatively affect driving, and any other health problems
that can pose a threat to oneself or others while driving.
These items assess risk-bearing health conditions, which
cause traffic accidents. The questionnaire is completed
by drivers every 2 years and when the persons’ competence
for driving comes into question. The possible responses
to the items are ‘Yes’ and ‘No’ (23), which respectively rep-

resent the presence or the absence of problems and are
scored 1 and 0. Consequently, the total possible score on
the questionnaire is 0 - 17. The presence of 3 or more prob-
lems indicates high-risk health condition and denotes in-
competence for driving and the need for referral to occu-
pational medicine specialists (23).

3.3. Translation Steps

The methods used to validate the DMQ included:
Translational validity: content validity and face valid-
ity. Reliability tests: internal consistency (Kuder-
Richardson 21 formula) and test-retest reliability.
A flow chart depicting the processes used to examine
the validity of the DMQ is presented in Figure 1.
Initially, the necessary permission was obtained from

the developer of the questionnaire. The English-Persian
translation and the psychometric evaluation of the DMQ
were performed based on the protocol of the International Quality of Life Assessment Project and in the following steps (27).

Step 1; Translation: The questionnaire was translated from English into Persian by 2 independent native Persian speakers who were competent in text translation. Then, in a joint meeting, the translators and the authors unified the 2 translations in order to develop a single translation. Thereafter, 2 other translators were invited to independently back-translate the final Persian version into English. After that, the Persian-English translators and the authors held a meeting to generate a single version of the questionnaire from the 2 English translations. The final English version of the questionnaire was compared with the original English DMQ and approved by a physician who mastered both English and Persian. The final English version of the questionnaire was sent to the Occupation Health Solution, England. The institute confirmed the similarity between our English DMQ and the original version of the questionnaire.

Step 2; Validity assessment:
1. Content validity
To assess the questionnaire for appropriateness and relevance to the study’s purpose, its content validity was measured. Content validity indicates that the content reflects a complete range of the attributes under study and is usually completed by 7 or more experts (28, 29). To estimate the content validity of the PDMQ, the researchers clearly defined the conceptual framework of the drivers’ medical problems by conducting a thorough literature review and seeking expert opinion. Once the conceptual framework was established, 8 purposely chosen expert committee, in the areas of nursing, questionnaire design, and screening tools, were asked to review the draft 17-item DMQ to ensure it was consistent with the conceptual framework. Each reviewer independently rated the relevance of each item on the DMQ to the conceptual framework using a 4-point Likert scale (1 = not relevant, 2 = somewhat relevant, 3 = relevant, 4 = very relevant). The Content Validity Index (CVI) was used to estimate the validity of the items (30).

2. Face validity
Face validity indicates that the questionnaire appears to be appropriate to the purpose of the study and content area. It is the easiest validation process to undertake, however, it is the weakest form of validity. It evaluates the appearance of the questionnaire in terms of feasibility, readability, consistency of style and formatting, as well as the clarity of the language used (29). Thus, face validity is a form of usability rather than reliability. To assess the face validity of the PDMQ, an evaluation form was developed to help respondents assess each question in terms of:
- The likelihood that the target audience would be able to answer the questions,
- The layout and style.

A total of 10 drivers were randomly selected and completed the face validity form on a Likert scale of 1 - 4, strongly disagree = 1, disagree = 2, agree = 3, and strongly agree = 4.

The face validity of the PDMQ was assessed by 10 drivers and a panel of 5 military doctors. They commented on the clarity, simplicity, and comprehensibility of the PDMQ items. If at least 80% of the assessors agreed on the clarity and the simplicity of each DMQ item, that item was considered to have face validity.

Step 3; Pilot study: A pilot study was done on a small sample of 45 traffic offenders recruited from 5 geographical areas of Tehran, Iran. The aim of the pilot study was to assess the drivers’ comprehension, interpretation, and perception of the items, determine the amount of time needed for completing the questionnaire, and improve the wording as well as comprehensibility of the items.

Step 4; Reliability assessment: The reliability of the PDMQ was assessed through the internal consistency analysis and the test-retest reliability assessment techniques.

The 45 traffic offenders were invited to complete the PDMQ twice, with a 14 day interval. Then, the Intraclass Correlation Coefficient (ICC) was calculated between the scores obtained from 2 measurement time points.

Step 5; Sampling: The required sample size was calculated based on the Cochrane formula of the drivers risky behaviors in previous studies (d = 0.05, z = 1.96, P = 0.64). As such, approximately 360 drivers were determined for this study (Figure 1).

Consequently, convenient samples of 360 drivers were recruited from among traffic offenders who had been referred to the Center for Seized Cars, Tehran, Iran. The drivers were included in the study if they were ages 18 years or older, could speak Persian, did not suffer from cognitive disorders, agreed to participate in the study, and had obtained their drivers license at least 1 year prior. They were asked to complete the PDMQ and a researcher-made demographic questionnaire.

3.4. Data analysis
The study data were analyzed using the SPSS software (v. 23.0). The Kuder-Richardson 21 (KR21) formula was used to assess the internal consistency of the PDMQ while the test-retest reliability was assessed by calculating the ICC between the 2 measurements. Chi-square test and Fisher’s exact test were conducted to assess the association between the drivers’ health status and their demographic characteristics. All of the statistical analyses were performed by a significance level of less than P < 0.05.
4. Results

All 17 items of the PDMQ had simple, clear, and appropriate wording. Most (80%) of the face validity assessors confirmed that with the exception of 2 items, the remaining items were clear and simple. The 2 items were reworded based on the military physicians and the drivers’ comments.

The Kr21 value for the PDMQ was 0.68. The Kr21 values that are greater than 0.7 are considered satisfactory.
5. Discussion

Physical and mental health are significant factors affecting the drivers’ performance. Some physical and mental health problems can cause negative traffic-related consequences. Using a valid screening tool can help accurately identify drivers’ physical and mental health problems. This test is used to screen all drivers, while prediction of driving performance among the disabled should use other tests (31).

In the present study, the DMQ was translated into Persian and then, its psychometric properties were evaluated. The participants were able to answer the items on the PDMQ without difficulty. The findings revealed that the questionnaire has acceptable face validity, denoting that the face of the questionnaire is appropriate for measuring the intended variable. The results of internal consistency analysis, by using the Kr21 method, also indicated that the PDMQ has an acceptable internal consistency. The test-retest stability analysis, through calculating ICC, showed that the PDMQ has a high stability, confirming its high reliability. In designing a self-report fatigue questionnaire for intercity bus drivers, all 21 items had enough simplicity, clarity, and relevance criteria (CVR > 0.99, CVI > 0.75). The reliability of the final questionnaire was also confirmed (\( \alpha = 0.93 \)) (32). In this study there are similar statements of the current questionnaire. This questionnaire measured the bus drivers’ fatigue.

The present study showed that young male traffic offenders are most frequently affected with RTI, which is in line with previous studies. For instance, Yousefzadeh et al., showed that the number of men involved in RTI was 3.6 times the women and about 50% of the drivers were 20 - 44 years old (33). Duke et al., (2010) also reported that the rate of traffic offense is higher among men (13). The results of a study conducted in Iran on the gender of accident victims also reported that the male-female ratio was 4.2 to 1 (34). Elvik reported that the rate of risky driving-related behaviors among men is higher than women (35). Our findings indicated that most of the traffic offenders were aged 31 - 39 years. Roudsari et al., (2004) also found that the mean age of drivers who suffered accidents in Iran was 31 (36). De Winter and Dodou (2010) reported the same finding (37). Attarchi et al., (2012) found a significant correlation between age and the incidence of traffic accidents (38). All these findings highlighted the necessity to provide education to the drivers in this age group (39).

We also found that the drivers’ health status was significantly associated with a history of accidents in the past 3 years and a history of injury-associated accidents. However, drivers’ health status had no significant association with age, gender, marital status, educational attainment, employment status, driving experience, income, place of residence, type of car involved in the accident, the amount of drive time in a week, the distance traveled in a year (Km), or maximum speed in residential areas (Km/h).

One of the less expected results of the present study was the lack of relationship between drivers’ health status incidents and the age and driving experience of the drivers. The most reasonable explanation for this fact is the so-called healthy driver phenomenon that drivers don’t want to lose the gain of driving. It is known that driver’s risk rise with age due to negative influences of road crashes (40).

The findings of the present study showed that approximately half of the participants had at least 1 health problem and approximately 10% had more than 3 health prob-
## Table 1. Distribution of Study Subjects According to Demographic Characteristics and Its Relation to Drivers' Health

<table>
<thead>
<tr>
<th>Variable</th>
<th>Number (%)</th>
<th>No Health Problems Number (%)</th>
<th>Unhealthy Drivers (at Least One Health Problem) Number (%)</th>
<th>Statistical Test/ Sig</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Age, years</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>20 &gt; 19</td>
<td>19 (5.3)</td>
<td>14 (7.6)</td>
<td>5 (2.8)</td>
<td></td>
</tr>
<tr>
<td>21 - 29</td>
<td>94 (26.1)</td>
<td>51 (27.7)</td>
<td>43 (24.4)</td>
<td></td>
</tr>
<tr>
<td>30 - 39</td>
<td>129 (35.8)</td>
<td>86 (31.2)</td>
<td>68 (26.6)</td>
<td></td>
</tr>
<tr>
<td>40 - 49</td>
<td>77 (21.4)</td>
<td>39 (21.2)</td>
<td>38 (21.6)</td>
<td></td>
</tr>
<tr>
<td>&gt; 50</td>
<td>41 (11.4)</td>
<td>19 (30.3)</td>
<td>22 (32.5)</td>
<td></td>
</tr>
<tr>
<td><strong>Sex</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Female</td>
<td>32 (8.9)</td>
<td>14 (7.6)</td>
<td>18 (10.2)</td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>328 (91.1)</td>
<td>170 (24.4)</td>
<td>158 (25.6)</td>
<td></td>
</tr>
<tr>
<td><strong>Married</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Single</td>
<td>104 (28.9)</td>
<td>47 (25.5)</td>
<td>57 (32.4)</td>
<td></td>
</tr>
<tr>
<td>Married</td>
<td>256 (71.1)</td>
<td>137 (41.5)</td>
<td>119 (37.6)</td>
<td></td>
</tr>
<tr>
<td><strong>Level of Education</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Under Diploma</td>
<td>223 (61.9)</td>
<td>113 (61.4)</td>
<td>110 (62.5)</td>
<td></td>
</tr>
<tr>
<td>The academic</td>
<td>137 (38.1)</td>
<td>71 (38.6)</td>
<td>66 (37.5)</td>
<td></td>
</tr>
<tr>
<td>1 &gt; 1</td>
<td>12 (3.3)</td>
<td>5 (2.7)</td>
<td>7 (3.7)</td>
<td></td>
</tr>
<tr>
<td>1 - 5</td>
<td>51 (14.2)</td>
<td>23 (12.5)</td>
<td>28 (15.9)</td>
<td></td>
</tr>
<tr>
<td><strong>Driving experience, years</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>&gt; 6</td>
<td>292 (81.3)</td>
<td>154 (83.7)</td>
<td>138 (78.4)</td>
<td></td>
</tr>
<tr>
<td>Not have certification</td>
<td>5 (1.4)</td>
<td>2 (1.1)</td>
<td>3 (1.7)</td>
<td></td>
</tr>
<tr>
<td>Unemployed</td>
<td>45 (12.5)</td>
<td>23 (12.5)</td>
<td>22 (12.5)</td>
<td></td>
</tr>
<tr>
<td>self-employed</td>
<td>183 (50.5)</td>
<td>93 (50.5)</td>
<td>90 (51.1)</td>
<td></td>
</tr>
<tr>
<td>jobholder</td>
<td>92 (25.8)</td>
<td>48 (26.1)</td>
<td>45 (25.6)</td>
<td></td>
</tr>
<tr>
<td>Driver</td>
<td>39 (10.8)</td>
<td>20 (10.9)</td>
<td>19 (10.8)</td>
<td></td>
</tr>
<tr>
<td>&gt; 10</td>
<td>173 (48.3)</td>
<td>88 (47.8)</td>
<td>85 (48.3)</td>
<td></td>
</tr>
<tr>
<td><strong>Income, Million/Rials</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>20 - 30</td>
<td>26 (7.2)</td>
<td>10 (5.4)</td>
<td>16 (9.3)</td>
<td></td>
</tr>
<tr>
<td>&gt; 31</td>
<td>11 (3.1)</td>
<td>3 (1.6)</td>
<td>8 (4.5)</td>
<td></td>
</tr>
<tr>
<td>Location in the last two years</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Tehran</td>
<td>301 (83.6)</td>
<td>158 (85.9)</td>
<td>143 (81.3)</td>
<td></td>
</tr>
<tr>
<td>Township</td>
<td>59 (16.4)</td>
<td>26 (44.1)</td>
<td>33 (18.8)</td>
<td></td>
</tr>
<tr>
<td>pride</td>
<td>246 (68.3)</td>
<td>132 (71.7)</td>
<td>114 (64.7)</td>
<td></td>
</tr>
<tr>
<td>Types of Peugeot</td>
<td>42 (11.7)</td>
<td>16 (8.7)</td>
<td>16 (14.8)</td>
<td></td>
</tr>
<tr>
<td><strong>Type car crash</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>International car</td>
<td>28 (7.8)</td>
<td>12 (6.5)</td>
<td>16 (9.3)</td>
<td></td>
</tr>
<tr>
<td>Van</td>
<td>5 (1.4)</td>
<td>1 (0.5)</td>
<td>4 (2.3)</td>
<td></td>
</tr>
<tr>
<td>Other cars</td>
<td>39 (10.8)</td>
<td>23 (12.5)</td>
<td>16 (9.3)</td>
<td></td>
</tr>
<tr>
<td>100000 &gt;</td>
<td>114 (31.7)</td>
<td>61 (31.2)</td>
<td>53 (30.1)</td>
<td></td>
</tr>
<tr>
<td>100000 - 200000</td>
<td>101 (28.1)</td>
<td>50 (27.2)</td>
<td>51 (29)</td>
<td></td>
</tr>
<tr>
<td>20000 - 400000</td>
<td>72 (20.7)</td>
<td>38 (20.7)</td>
<td>34 (19.3)</td>
<td></td>
</tr>
<tr>
<td>40000 - 500000</td>
<td>11 (3.1)</td>
<td>6 (3.3)</td>
<td>5 (2.8)</td>
<td></td>
</tr>
<tr>
<td>50km/h &gt;</td>
<td>62 (17.2)</td>
<td>29 (15.7)</td>
<td>33 (18.2)</td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>49 (13.6)</td>
<td>14 (7.6)</td>
<td>35 (19.9)</td>
<td></td>
</tr>
<tr>
<td>No</td>
<td>311 (86.4)</td>
<td>170 (92.4)</td>
<td>141 (80.1)</td>
<td></td>
</tr>
<tr>
<td><strong>Annual mileage, Km</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>100000 &gt;</td>
<td>268 (72.4)</td>
<td>150 (81.5)</td>
<td>118 (67)</td>
<td></td>
</tr>
<tr>
<td>200000 - 400000</td>
<td>73 (20.3)</td>
<td>27 (47.7)</td>
<td>46 (26.3)</td>
<td></td>
</tr>
<tr>
<td>4 accident &gt;</td>
<td>12 (3.3)</td>
<td>5 (2.7)</td>
<td>7 (4)</td>
<td></td>
</tr>
<tr>
<td>Maximum speed the city, km/h</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>50km/h &gt;</td>
<td>120 (33.3)</td>
<td>66 (35.9)</td>
<td>54 (30.7)</td>
<td></td>
</tr>
<tr>
<td>50 - 100</td>
<td>210 (58.3)</td>
<td>108 (58.7)</td>
<td>102 (58)</td>
<td></td>
</tr>
<tr>
<td>101 - 150</td>
<td>18 (5)</td>
<td>7 (3.8)</td>
<td>11 (6.3)</td>
<td></td>
</tr>
<tr>
<td>&gt; 150 km/h</td>
<td>12 (3.3)</td>
<td>5 (1.6)</td>
<td>9 (5.1)</td>
<td></td>
</tr>
</tbody>
</table>
Table 2. Status Health of Offending Drivers to Traffic Accident

<table>
<thead>
<tr>
<th>Health Status</th>
<th>Number</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Healthy</td>
<td>184</td>
<td>51.1</td>
</tr>
<tr>
<td>With a medical condition</td>
<td>137</td>
<td>38.1</td>
</tr>
<tr>
<td>With two medical conditions</td>
<td>23</td>
<td>6.4</td>
</tr>
<tr>
<td>With three medical conditions or more</td>
<td>16</td>
<td>4.4</td>
</tr>
<tr>
<td>Total</td>
<td>360</td>
<td>100</td>
</tr>
</tbody>
</table>

Table 3. Frequency of the Health Status of Offending Drivers to Traffic Accident

<table>
<thead>
<tr>
<th>Question</th>
<th>Statements</th>
<th>Yes Number (%)</th>
<th>No Number (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Impairment of vision.</td>
<td>20 (5.6)</td>
<td>340 (94.4)</td>
</tr>
<tr>
<td>2</td>
<td>Difficulty seeing well enough to drive when there is glare or poor visibility such as fog.</td>
<td>46 (12.8)</td>
<td>314 (87.2)</td>
</tr>
<tr>
<td>3</td>
<td>Fits, epilepsy, fainting or blackouts.</td>
<td>9 (2.5)</td>
<td>315 (97.5)</td>
</tr>
<tr>
<td>4</td>
<td>Attacks of dizziness or vertigo.</td>
<td>2 (0.6)</td>
<td>358 (99.4)</td>
</tr>
<tr>
<td>5</td>
<td>Weakness, loss of sensation or clumsiness affecting part of your body.</td>
<td>12 (3.3)</td>
<td>348 (96.7)</td>
</tr>
<tr>
<td>6</td>
<td>Severe head injury or brain surgery.</td>
<td>5 (1.4)</td>
<td>355 (98.6)</td>
</tr>
<tr>
<td>7</td>
<td>Difficulty hearing normal conversation.</td>
<td>12 (3.3)</td>
<td>348 (96.7)</td>
</tr>
<tr>
<td>8</td>
<td>Trouble with your back or neck causing absence from work or a change in duties</td>
<td>12 (3.3)</td>
<td>348 (96.7)</td>
</tr>
<tr>
<td>9</td>
<td>Any form of cancer.</td>
<td>15 (4.2)</td>
<td>345 (95.8)</td>
</tr>
<tr>
<td>10</td>
<td>Diabetes.</td>
<td>13 (3.8)</td>
<td>347 (96.4)</td>
</tr>
<tr>
<td>11</td>
<td>Psychiatric illness including depression or anxiety.</td>
<td>16 (4.4)</td>
<td>(95.6)%</td>
</tr>
<tr>
<td>12</td>
<td>Dependency on or misuse of alcohol, drugs or other substances.</td>
<td>12 (3.3)</td>
<td>348 (96.7)</td>
</tr>
<tr>
<td>13</td>
<td>Disease of the heart or circulation including angina, heart attack or heart valve problems.</td>
<td>8 (2.2)</td>
<td>352 (97.8)</td>
</tr>
<tr>
<td>14</td>
<td>Abnormal heart rhythm or irregular heartbeat.</td>
<td>15 (4.2)</td>
<td>345 (95.8)</td>
</tr>
<tr>
<td>15</td>
<td>High blood pressure.</td>
<td>45 (12.5)</td>
<td>315 (87.5)</td>
</tr>
<tr>
<td>16</td>
<td>Any serious medical condition that may result in you being a danger to yourself or others when driving.</td>
<td>10 (2.8)</td>
<td>350 (97.2)</td>
</tr>
<tr>
<td>17</td>
<td>History of drug use.</td>
<td>152 (42.2)</td>
<td>208 (57.8)</td>
</tr>
</tbody>
</table>

The high prevalence of physical health problems among drivers and the significant association between health problems and history of accidents emphasize the real necessity of screening for identifying drivers’ health problems in order to reduce the rate of accidents. People and Adio (2014) reported that implementing screening procedures for identifying vision problems among elderly drivers who aged 65 or more significantly reduced the rate of accidents by 12% during a screening time period of 3 years (44). Driving is a risky task, which can cause irreversible damage to individuals and communities. Drivers’ health status should be evaluated regularly in order to identify high-risk drivers, which can in turn reduce the rate of accidents that occur due to drivers’ physical health problems. An electronic health record system should be developed in order to effectively monitor the drivers’ health status over time.

One of the strengths of the present study was the strict adherence to the protocol for translating tools as proposed by the reliable sources (45). In this study we translated the DMQ into Persian and evaluated its psychometric properties. The study also faced several limitations including sampling from a small geographical area as well as data collection through a self-report technique. Information about medical conditions was obtained by self-report. As such, participants may forget or be unwilling to share certain information. However, previous research has reported that there is excellent agreement between self-report of medical conditions and confirmation using medical records.

5.1. Conclusion

The PDMQ is a simple, valid, and reliable tool for the screening of drivers’ health problems. The items of the PDMQ are short and easy to comprehend. The scoring of
the questionnaire can be done easily. The questionnaire is not time consuming and requires approximately 10 minutes to complete. Therefore, the PDMQ can be used for the screening of drivers’ health problems in different situations. Further studies are still needed in order to evaluate the suitability of the PDMQ in other contexts.

Acknowledgments

This article emanated from a PhD dissertation in nursing, which had been approved by the Research Council and the Ethics Committee of Baqiyatallah University of Medical Sciences, Tehran, Iran. Hereby, we thank the Trauma Research Center of the university for financially supporting the study as well as the drivers who participated in the study. We are also grateful to the Tehran Traffic Police, Tehran, Iran.

Footnotes

Authors’ Contribution: Azam Saei: Study conception, data collection, and drafting of the manuscript, Ali Rahmani supervised the study, Abbas Ebadi performed statistical analysis, Hosein Mahmoudi, Masoud Sirati Niz, and Hamid Reza Khankeh were the study advisors, all of the authors critically evaluated the paper and provided the final draft.

Funding/Support: This study was financially supported by Trauma Research Center, Baqiyatallah University of Medical Sciences.

Conflict of Interest: The authors declared no potential conflicts of interest with respect to the research, authorship, or publication of this article.

References


23. DVLA U. At a Glance Guide to the Current Medical Standards of Fitness to Drive. Swansea: Drivers Medical Group DVLA; 2010.


