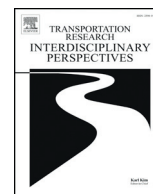




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The association between lifestyle and aberrant driving behavior among Iranian car drivers



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ABSTRACT

Aberrant driving is one of the most important contributors to traffic crashes, and drivers' lifestyle attributes might affect aberrant driving behavior. However, people in developing countries, especially in the Middle East, usually reflect crucial differences in lifestyle compared to people in Europe and the United States. Iran may be perceived as a society with multiple cultural and lifestyle facets, and people reflect a mixed Islamic and Western lifestyle. The present study aimed to investigate the associations between lifestyle dimensions and aberrant driving behavior among Iranian drivers. For this purpose, 1260 drivers with driving license responded to a questionnaire including items about socio-demographic characteristics, lifestyle dimensions, and the Driver Behavior Questionnaire (DBQ). Structural equation modeling (SEM) showed that most of the lifestyle dimensions (Car hobby, Religion, Morality, and Culture) had significant associations with driving behavior. Car hobby (driving for recreational purposes) positively predicted driving errors, lapses, ordinary violations, and aggressive violations. Religion and Morality (a focus on ethical aspects in life) were negative predictors of all the aberrant driving behavior factors. Ordinary violations and aggressive violations were further negatively predicted by culture, operationalized as participation in cultural activities (e.g. reading books). Policies aimed at reducing drivers' car hobby can be focused on the process of education for obtaining and extending the driver's license. The syllabus can be updated to shed light on disadvantages of driving for pleasure/fun. Promotion of cultural activities through the mass media and educational institutions such as schools, libraries, and universities may also increase awareness and calm people, which in turn may be associated with a reduction in aberrant driving behavior.

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1. Introduction

Traffic crash fatalities are considered as a major public health problem worldwide. This also applies to Iran, a developing country with almost 17,000 annual traffic fatalities (Iranian Legal Medicine Organization, 2019), which equates to 21.3 deaths per 100,000 inhabitants. Previous studies have shown that various human factors, roadway and vehicle characteristics, and environmental variables might influence traffic crash occurrences, among which the human factors have a prominent role (World Health Organization, 2001).

Driving behavior can be considered as one of the main components of the human factor in traffic safety (Porter, 2011). Several studies have been conducted to investigate driving behavior and its relation to crash involvement. To measure driving behavior, several dimensions have been proposed and empirically tested through questionnaires, such as the Driver Behavior Questionnaire (DBQ) which was introduced in 1990 (Reason

et al., 1990). Dimensions of the DBQ have been examined as predictors of traffic crash involvement. The DBQ items are generally classified into two factors, including errors that refer to the failure of planned actions, and violations which include deliberate infringement of traffic regulations. The findings have consistently shown that violations (Chu et al., 2019; Mesken et al., 2002) and errors (Cordazzo et al., 2014; Freeman et al., 2009; Stanojević et al., 2018; Zhang et al., 2019), significantly predict drivers' crash involvement risk. These results indicate the importance of analyzing driving behavior dimensions as critical components of the human factor which could influence traffic crashes.

Studies in this domain had a multi-disciplinary approach and attempted to explain driving behavior that increases the risk of traffic crashes. Rothengatter (1997) suggested that motivational and attitudinal factors might influence driving behavior. It has also been shown that driving motives might be affected by lifestyle attributes among drivers (Møller and Hausteijn, 2013). It is assumed that lifestyle is an expression of human

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values as demonstrated by several lifestyle studies (Lööv and Miegel, 1990) such as the VALS (Values, Attitudes, and Lifestyles) typology of nine American lifestyle groups (Mitchell, 1983) and categorization of values (Life philosophy and lifestyle) (Kamler, 1984). Indeed, the concept of lifestyle is most often used to define basic values, interests, and leisure activities (Berg, 2001). A direct relationship between lifestyle and driving behavior has also been found in previous studies (Chliaoutakis et al., 2005; Møller and Haustein, 2013). Lööv and Miegel (1990) included four values to define lifestyle: moral (ethical) values, religious (metaphysical) values, material values, and aesthetic values. Ethical values lead to actions that have a moral basis such as respect for other people or obeying the rules (i.e. “morality”). The values which are related to individuals' conviction of God's existence and religious beliefs are here defined as “Religion”. Further, material values may influence attitude about how to spend the leisure time and use of money (Berg, 2001). “Amusement” and “car hobby” refer to how people spend their leisure time and are related to material values. Finally, attitudes arising from aesthetic values may lead people to enjoy literature and music. “Culture”, including items such as listening to music and reading books, indicates this value. Generally, these values govern the actions which reflect the lifestyle of individuals (Berg, 2001).

In regards to the relationship between lifestyle, driving behavior and crash involvement, a study conducted among young drivers showed that those with religious beliefs and who participated in cultural activities had a lower crash risk (Chliaoutakis et al., 1999). Chliaoutakis et al. (2005) demonstrated that religion and culture (e.g. reading literature and going to the theater) might have a significant negative association with aberrant driving behavior operationalized by the DBQ. Driving without a specific destination as well as sports (e.g. conducting sport activities and going to sports games) could lead to aberrant driving behavior (Chliaoutakis et al., 2005). Furthermore, another study showed that religious convictions might be positively related to obeying traffic regulations (Nabipour et al., 2015). Additionally, Gnardellis et al. (2008) argued that religion as a lifestyle factor might have a negative relationship with drivers' crash involvement risk. Papadakaki et al. (2008) investigated the relationship between lifestyle factors and drowsy driving. They reported that religion might have a negative association with drowsy driving, and amusement was related to drowsy driving. Several previous studies that focused on the human factor (except lifestyle) have examined driving behavior (Besharati and Tavakoli Kashani, 2018; Nordfjærn et al., 2014; Şimşekoğlu et al., 2013). The present study will advance previous work by investigating whether, and if so how, lifestyle dimensions relate to driving behavior in a large sample of Iranian drivers across five cities. Lööv and Miegel's (1990) theory argued that moral values might be considered as a type of lifestyle; hence morality items were used in this study as a dimension of lifestyle as opposed to previous studies. In addition, questionnaire items regarding Islamic beliefs were used to test the effects of religious lifestyle aspects on driving behavior. Further, the tendency of driving a car to obtain self-enhancement or personal goals (mainly among young drivers) may be more prominent in contexts where these values are important. However, people in developing countries, especially in the Middle East, usually reflect crucial differences in lifestyle compared to people in Europe and the United States. Moreover, some aspects of the western lifestyle have been developed and integrated among Iranians in recent decades, while religious beliefs traditionally have a substantial role. Iran may be perceived as a society with multiple cultural and lifestyle facets, and people reflect a mixed Islamic and Western lifestyle. Since religion and morality could have key roles in forming the Iranian lifestyle, the current study was carried out to investigate these lifestyle dimensions in addition to car hobby, culture, and amusement as predictors of driving behavior in a sample of Iranian drivers.

2. Material and methods

2.1. Procedure

The sample consisted of 1260 car drivers randomly selected from various gatherings such as university campuses, business centers, government offices, and private companies in five cities in Iran. The cities included

Tehran, Mashhad, Qom, Yazd, and Birjand selected by a convenience sampling method. Since the questionnaire was designed for drivers, solely individuals with a driver's license were eligible for participation.; In all cases, drivers were asked to complete the hardcopy questionnaire during their break, and they were assured anonymity and confidentiality.

2.2. Materials

In this study, a 28-item version of the DBQ was used. This version of the instrument has previously been used to study professional drivers (Mehdizadeh et al., 2019), private motorists (Gras et al., 2006; Nordfjærn and Şimşekoğlu, 2014; Tavakoli Kashani et al., 2016) as well as professional and non-professional drivers simultaneously (Arafa et al., 2019; Maslač et al., 2018). The DBQ components in the current study included: lapses (8 items), errors (6 items), ordinary violations (9 items), and aggressive violations (3 items). DBQ items were based on a Likert scale ranging from 1 = never to 6 = always.

In addition, several questions regarding lifestyle dimensions and socio-demographic items were included in the questionnaire. Some items of the lifestyle questionnaire as reported in previous studies (Gregersen and Berg, 1994), were applied to measure lifestyle dimensions. Some modifications were performed to the questionnaire due to cultural and religious differences. Items related to religion and morality were added from the Islamic lifestyle questionnaire introduced in Iran (Kaviani, 2013). Each item was recorded on a Likert scale ranging from 1 = never to 5 = almost always in the lifestyle questionnaire.

2.3. Statistical analysis

First, the underlying dimensionality of the instruments was investigated. Since some amendments were conducted to the items in the lifestyle instrument, the dimensionality of the lifestyle items was examined by principal component analysis (PCA). Because we used the original version of the DBQ with 28 items, confirmatory factor analysis (CFA) was applied to analyze this instrument. Cronbach's alpha coefficients were calculated as reliability indices.

In the next step, a first-order model was constructed to measure the association between lifestyle dimensions and aberrant driving behavior factors. This model consisted of four latent endogenous variables (DBQ factors) and four latent exogenous variables (lifestyle dimensions).

Model fit was determined by the goodness of fit indices (GFI), comparative fit indices (CFI), and root mean square error of approximation (RMSEA). For the GFI, a cut-off point value of 0.90 has been recommended (Byrne, 1994). RMSEA values of 0.05 or below indicate a good fit between the model and data. A value between 0.05 and 0.08 reflects a close fit (Ho, 2013). The recommended value for the CFI ranges from 0.90 to 0.95 (Kim and Bentler, 2006).

3. Results

3.1. Sample characteristics

There were 876 (69%) males and 384 (31%) females in the sample. The participants had a mean age of 34.15 ($SD = 9.31$) and ranged from 18 to 72 years and 35% ($N = 436$) of them were aged below 30 years. The driving experience of participants ranged from 1 to 45 years with a mean of 11.81 ($SD = 8.10$) years. As shown in Table 1, about 51% of participants had obtained their driving license at least 10 years before participating in this survey. Furthermore, 70% of the sample were married and about 47% had a bachelor's degree.

3.2. PCA for lifestyle questionnaire

Table 2 presents the results of a PCA performed on the lifestyle instrument. Five dimensions emerged which were labeled religion, morality,

Table 1
Socio-demographic characteristics of participants.

Characteristics	N	%
Gender		
Male	876	69.5
Female	384	30.5
Age		
18–24	178	14.3
25–29	258	20.7
30–39	472	37.9
40–55	310	24.9
55+	28	2.2
Marital status		
Married	887	70.5
Unmarried	372	29.5
Educational degree		
Up to junior high school	59	4.7
Senior high school	299	23.8
Bachelor degree	593	47.3
Master degree	259	20.7
Ph.D.	43	3.4
Possession of driver's license (years)		
Up to 5 years	272	23.3
6–10	328	28.1
11–15	347	29.7
16–20	117	10
20+	105	9

car hobby, culture, and amusement. These dimensions explained 45% of the total variance.

3.3. Confirmatory factor analysis (CFA) for the driver behavior questionnaire

A CFA model for DBQ was applied in this study. The results were consistent with previous studies (Lajunen et al., 2004; Mattsson, 2012) and are presented in Table 3. All the loading items in the CFA model were higher

Table 2
PCA of the lifestyle questionnaire.

	Dimension loading	M	SD
Religion (Cronbach's alpha = 0.76)			
Participating in religious rituals	0.73	3.18	1.33
Opposing with having a non-Muslim spouse	0.70	3.96	1.40
Believing in the usefulness of pilgrimage (religious journeys)	0.69	4.32	1.11
Inviting other people to praying	0.68	3.46	1.28
Obedying religious orders in the relationship with the opposite gender	0.62	3.39	1.39
Thinking that wearing hijab is necessary	0.57	3.54	1.47
Morality (Cronbach's alpha = 0.51)			
Carefully performing duties	0.67	4.52	0.65
Adhering to promises	0.67	4.54	0.70
Acting modestly toward others	0.65	4.33	0.77
Controlling him/herself in conflicting with others	0.57	3.90	1.09
Car hobby (Cronbach's alpha = 0.60)			
Driving without a specific destination	0.75	1.76	1.12
Driving for achieving excitement	0.73	2.01	1.28
Driving with friends	0.63	2.56	1.33
Culture (Cronbach's alpha = 0.51)			
Doing writing	0.71	2.47	1.49
Reading books	0.67	2.61	1.37
Reading magazines or newspapers	0.59	3.13	1.41
Listening to classical music	0.46	2.96	1.47
Amusement (Cronbach's alpha = 0.50)			
Going out for recreational purposes	0.69	3.95	1.02
Traveling outside the province	0.66	2.57	0.92
Going to cinema	0.57	2.07	1.18
Doing sports	0.47	2.94	1.65

Table 3
Confirmatory factor analysis results of the DBQ items.

	Factor loading	M	SD
Lapses (Cronbach's alpha = 0.69)			
No clear recollection of the road along which you have just traveled	0.54	1.70	0.84
Get into the wrong lane approaching a roundabout or junction	0.50	2.26	0.96
Misread the signs and exit from a roundabout on the wrong road	0.48	2.02	0.85
Attempt to drive away from the traffic lights in third gear	0.47	1.91	1.12
“Wake up” to find yourself heading for a wrong, but more familiar destination	0.45	1.94	0.87
Switch on one thing when you meant to switch on something else	0.44	2.04	0.97
Forget where you left your car in the car park	0.43	1.93	0.93
Hit something when reversing that you have not previously seen	0.39	1.86	0.80
Errors (Cronbach's alpha = 0.77)			
Fail to notice pedestrians crossing when turning into a side street from a main road	0.66	1.66	0.84
Miss “Give Way” sign and narrowly avoid a collision	0.62	1.72	0.94
Queuing to turn right, nearly hit the car in front	0.61	1.85	0.89
Attempt to overtake someone signaling a left turn	0.61	1.88	0.88
Underestimate the speed of an oncoming vehicle when overtaking	0.56	1.80	0.81
Brake too quickly, or steer the wrong way into a skid	0.53	1.63	0.90
Ordinary violations (Cronbach's alpha = 0.73)			
Race away from the traffic lights to beat another driver	0.61	1.77	1.12
Drive close to the car in front, making it difficult to stop in an emergency	0.58	1.90	0.84
Cross an intersection knowing that the traffic lights have already turned against you	0.56	2.13	0.99
Drive when you suspect you may be over the legal speed limit	0.51	2.09	1.14
Overtake a slow driver on the inside	0.51	2.50	1.30
Pull out of an intersection so far you force your way into the traffic	0.45	2.31	1.08
Disregard the speed limit on the highway	0.45	2.29	1.28
Disregard the speed limit on a residential road	0.43	2.48	1.39
Stay in a lane about to close until the last minute, then drive-in	0.43	1.96	1.08
Aggressive violations (Cronbach's alpha = 0.66)			
Angered by a certain type of driver, show your hostility	0.73	1.94	1.01
Angered by another driver, give chase	0.63	1.59	0.93
Sound your horn to indicate your annoyance at another road user	0.57	2.09	1.09

than 0.30, except for one item (“Fail to check rear-view mirror before a maneuver”) which was removed. Moreover, one item (“on turning right, nearly hit a cyclist coming up on your inside”) were not within the acceptable range of skewness and kurtosis and was therefore removed. Two fit indices of the DBQ confirmatory factor analysis reflected an acceptable range (RMSEA = 0.055, GFI = 0.91, and CFI = 0.86).

3.4. Relationship between lifestyle dimensions and aberrant driving behavior

As mentioned, relationships between lifestyle dimensions and aberrant driving were investigated through a SEM model in the current study. Fig. 1 presents the paths between four exogenous latent variables of lifestyle (religion, car hobby, culture, and morality) and four endogenous latent variables of aberrant driving behavior (lapses, errors, ordinary violations, and aggressive violations). Paths that failed to reach significance are not shown in Fig. 1.

As shown in Fig. 1, religion negatively predicted lapses ($\beta = -0.19$), errors ($\beta = -0.12$), ordinary violations ($\beta = -0.27$), and aggressive violations ($\beta = -0.19$). Car hobby was positively associated with lapses ($\beta = 0.85$), errors ($\beta = 0.80$), ordinary violations ($\beta = 0.82$), and aggressive violations ($\beta = 0.64$). Culture had a negative relationship with ordinary violations ($\beta = -0.14$) and aggressive violations ($\beta = -0.17$). Finally, morality was a negative predictor of lapses ($\beta = -0.32$), errors ($\beta = -0.29$), ordinary violations ($\beta = -0.30$)

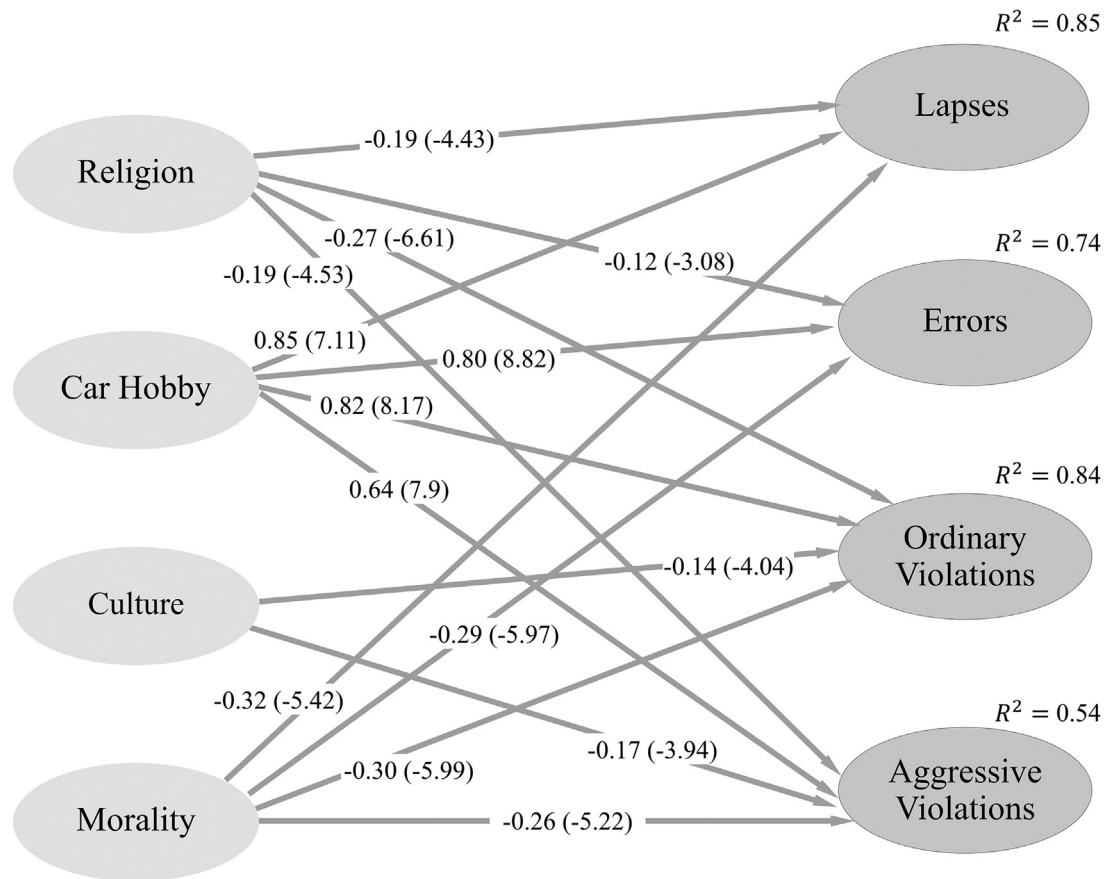


Fig. 1. Relationships between lifestyle dimensions and aberrant driving behavior factors. Note: Standardized regression weights and t -values (in parentheses) are shown for the structural relations.

and aggressive violations ($\beta = -0.26$). This model explained an overall 85%, 74%, 85%, and 0.54% of the variance in lapses, errors, ordinary violations and aggressive violations, respectively. Moreover, all of the critical ratios (t -values) shown in Fig. 1 indicated significant relationships at the 0.01 level and the model fit indices reflected an acceptable fit (RMSEA = 0.045, GFI = 0.90, CFI = 0.83).

4. Discussion

The current study aimed to investigate the relationship between lifestyle and driving behavior in Iran. For this purpose, the DBQ was used to measure aberrant driving behavior and the lifestyle questionnaire, including items related to religion, amusement, car hobby, morality, and culture, was used to measure various aspects of lifestyle. As an initial finding, this study showed a clear association between lifestyle dimensions and aberrant driving behavior. This extends previous results in western countries (Bina et al., 2006; Chliaoutakis et al., 2005; Papadakaki et al., 2008) to the context of Iran.

A negative association was found between drivers' religious beliefs and their aberrant driving behavior. In other words, the more religious faith a driver has, the less he/she commits aberrant driving behavior. Similar results were reported in previous studies; for instance, Chliaoutakis et al. (1999) showed that religiosity was related to lower crash risk among young drivers. Other studies showed that the religion factor of lifestyle was a negative predictor of ordinary violations (Chliaoutakis et al., 2005) and drowsy driving (Papadakaki et al., 2008).

The findings further reflected that the car hobby factor might influence all the four factors of aberrant driving behavior. An important part of this finding was the significant relationship between car hobby and aggressive violations. Some researchers have argued that driving without a specific

destination leads to higher crash risk (Chliaoutakis et al., 1999; Donovan et al., 1983). Further, Chliaoutakis et al. (2005) reported that driving without a specific destination was the only lifestyle factor that predicted aggressive violations. Another study showed that cruising with friends during leisure time was a predictor of aberrant driving (Møller and Sigurðardóttir, 2009). When a driver uses a car for purposes such as recreational needs and sensation seeking rather than mere transportation, the risk of deliberate violations may increase because he/she drives to reduce tension or to express negative feelings.

The results revealed that all four factors of aberrant driving behavior were negatively predicted by morality. In other words, our results may suggest that drivers who adhere more strongly to ethical principles drive safer than other drivers. Although previous research has not focused on morality to a large extent, this finding aligns somewhat with a study conducted by Elliott and Thomson (2010) which indicated that moral norm could be a negative predictor of speeding behavior intention. Parker et al. (1996) also showed that moral norms might predict lane-discipline violations. Morality may be a particularly important lifestyle trait in Iran because of the strong focus on this factor in Iranian culture and politics. Future research could incorporate this factor and examine its relative role for aberrant driving behavior across samples from Western countries and the Middle East.

Among other lifestyle dimensions, culture was significantly related to ordinary and aggressive violations. The results indicate that cultural activities might incline people to drive with fewer violations. This supports previous studies, for instance it has been reported that those who participate in cultural activities and hold cultural interests have lower crash risk (Chliaoutakis et al., 1999). Further, it has been shown that culture might be negatively related to deliberate violations (Chliaoutakis et al., 2005). In Model 2, however, amusement was not associated with any of the aberrant driving behavior factors. This is in line with the findings reported by

Chliaoutakis et al. (1999), where amusement was found to be insignificant in predicting crash risk or driving behavior. Nonetheless, several previous studies have reported that amusement is a significant predictor of driving behavior (Chliaoutakis et al., 2005; Papadakaki et al., 2008).

Finally, some of the results in the current study may need replication and further investigation in future studies. For instance, morality had a negative relationship with all the aberrant driving behavior dimensions, while previous studies did not include this lifestyle dimension. If drivers respect others while driving and adhere to traffic regulations, the high rates of road fatalities in developing countries may be reduced. The strong association between religion and risky driving was also noteworthy because Islam was the predominant religious beliefs among the participants, whereas most of the previous studies were conducted among individuals with a Christian background. On the other hand, errors and violations are usually caused by different psychological processes (Reason et al., 1990), but both were related to religion, morality, and car hobby in the current study. This was not investigated directly in previous studies and may suggest a prominent role of several lifestyle dimensions in committing aberrant driving behavior.

The strengths of the current study included the relatively large sample of Iranian car drivers and extension of the lifestyle concept to the context of Iran with a special religious and cultural situation. Concerning the critical condition of road fatalities in Iran, associations between lifestyle and risky driving behavior were investigated in five different cities in this country. However, the study also has limitations that need consideration when the results are interpreted. The self-reported nature of the measurement instruments may cause social desirability bias. However, research assistants who collected the data emphasized the anonymity and confidentiality of responses to the participants. Another limitation was the somewhat exploratory approach, due to this being the first study that examined lifestyle traits in relation to aberrant driving behavior in a Middle East society. The outlined conclusions should be regarded as tentative and should be investigated in further empirical research.

5. Conclusion

The results showed a statistically significant relationship between lifestyle dimensions and aberrant driving behavior. As a crucial finding, this study indicated that higher scores on car hobby were associated with more aggressive and ordinary violations. Policies aimed at reducing drivers' car hobby can focus on the process of education for obtaining and extending the driver's license. The syllabus can be updated to shed light on disadvantages of driving for pleasure or fun. Also, providing healthy recreational activities for people to avoid driving for recreational purposes in urban roads is an incentive policy. For instance, establishment of recreational driving tracks can be a suitable intervention to reduce car hobby. In addition, morality and religion might serve as disincentives for aberrant driving behavior, particularly in countries with strong religious penetration such as Iran. Potentially, strengthening ethical principles among people through the media and schools could help to diminish aberrant driving behavior and enhance safe driving in Iran and similar societies. Also, this study showed that culture was associated with fewer violations. Promotion of cultural activities (such as reading books) through the mass media and educational institutions such as schools, libraries, and universities may also increase awareness and calm people, which in turn may be associated with a reduction in aberrant driving behavior. Further research could dwell further into the association between driving behavior and ethical/religious aspects of lifestyle.

CRediT authorship contribution statement

Shahab Dabirinejad: Writing - original draft, Data curation, Methodology, Formal analysis, Investigation, Software. **Ali Tavakoli Kashani:** Conceptualization, Supervision, Writing - review & editing. **Trond Nordfjærn:** Conceptualization, Writing - review & editing.

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