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Investigating the Relationship between Motorcyclists' Lifestyle, Riding Behavior, and At-Fault Crashes

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ABSTRACT: Motorcyclists in developing countries ride on congested urban roads to earn money and are more likely to engage in risky behaviors. They may, however, be deterred by positive motivations and values. Previous studies have indicated that lifestyle reflects human values, which makes it essential to investigate the relationship between lifestyle and riding behavior. The current study aims to investigate relationships between lifestyle factors, aberrant riding behavior, and self-reported crashes in a sample of Iranian motorcyclists. A total of 437 male motorcycle riders participated in the study. The respondents completed a lifestyle questionnaire, a motorcycle rider behavior questionnaire (MRBQ), and items related to at-fault crashes and socio-demographics. To analyze the data, first, we used Explanatory Factor Analysis (EFA) to analyze the questionnaire structure. A Structural Equation Modeling (SEM) study was then conducted to find causal relationships between lifestyle variables, riding behavior, and at-fault crashes. Four factors emerged from the MRBQ as an outcome of EFA: traffic violations, speed violations, errors, and stunts. Results of SEM showed that motorcycle use for recreational purposes increased riders' likelihood of committing violations, errors, and stunts. As an interesting outcome, enhancing morality traits among motorcyclists (an exploratory factor considered in this study) may reduce their stunts to a significant extent. At-fault crashes are also positively associated with motorcyclists' errors, according to the model. The promotion of alternative ways of excitement-seeking may reduce aberrant riding behavior among motorcyclists. As well, implementing measures targeted towards riders with low socioeconomic status would reduce the length of time that they spend working by motorcycle and their errors, increasing safety in countries like Iran.

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1- Introduction

Motorcycles are widely used in low- and middle-income countries because it is an inexpensive vehicle that is convenient to use in congested traffic systems and park on narrow streets. Despite these advantages, motorcycle riders have elevated injury rates in low-and middle-income countries [1]. This also applies to Iran where motorcyclists are involved in a significant proportion of fatal crashes. Based on the report of the Iranian Legal Medicine Organization, motorcyclists have a large share of traffic fatalities in Iran with almost 3300 (19.4%) annual traffic fatalities [2].

Considering motorcycle use and its high risk, many researchers have studied factors that influence motorcycle crash risk. The main precursors of motorcycle crashes could be categorized into three groups including the motorcycle, the environment, and rider characteristics [3]. The research on the human factor's impact on driving behavior has increased over the past few decades. Studies in this area took a multidisciplinary approach to explain why driving behavior increases the risk of crashes. Motorcyclists in developing countries ride on congested urban roads to earn money and are more likely to engage in risky behaviors. They may, however, be deterred by positive motivations and values [4]. Miegel [5] indicated that lifestyle reflects human values, which makes it essential to investigate the relationship between lifestyle and riding behavior. Therefore, the theoretical framework of this study is summarized to create a model that the lifestyle of motorcyclists (as the reflection of their values) could explain aberrant riding behavior and their crashes. Unlike motorcycles, there have been some studies that have examined how lifestyle affects car driving behavior. Møller [6] showed that lifestyle and driving behavior can be connected to understanding driving's psychosocial function. Therefore, several researchers have investigated what lifestyle has to do with driving behavior among car drivers. Chliaoutakis, *et al.* [7] found that culture and religion have a negative effect on crash risk among young drivers in Greece. Driving without a destination, culture, or religion has been associated with risky driving behavior in another study [8]. Further, Gnardellis, *et al.* [9] showed that religion negatively predicted crashes among car drivers. Papadakaki, *et al.* [10] found that religion, sports activities, and amusement as lifestyle factors predicted drowsy driving among car drivers. Moreover, Dabirinejad, *et al.* [11] argued that religion, cultural activities, and morality negatively pre-

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dicted aberrant driving behavior in a sample of car drivers.

On the other hand, in studies related to driving behavior, motorcycle riders have generally received less empirical attention than car drivers. Elliott, *et al.* [3] investigated the behavioral aspects of motorcyclists by introducing Motorcycle Rider Behavior Questionnaire (MRBQ). It was one of the important studies that lead to conduct more attention to the behavior of motorcycle riders. We have summarized the most recent and important studies about motorcyclists' behavior in Table 1. As mentioned, the study of Elliott, *et al.* [3] paved the way for other research in this area. Motevalian, *et al.* [12] assess the validity and reliability of MRBQ in a sample of Iranian motorcyclists. Özkan, *et al.* [13] also investigated relationships between MRBQ factors, TPB, the health belief model, and locus of control among Turkish motorcycle riders. Furthermore, Sakashita, *et al.* [14] showed that motorcyclists' errors and speed violations negatively predicted crashes and near-crashes in Australia. Moreover, according to Stephens, *et al.* [15], a five-factor structure was appropriate for Australian (New South Wales) data that included traffic errors, speed violations, protective gear, control errors, and stunts. Additionally, they found that speed violations and control errors increased the odds of near-crash involvement, while stunt behaviors increased the odds of crash involvement. Indeed, they indicated that intentional behavior is partly responsible for the crash risk faced by riders in Australia. Additionally, speed violations and stunts were positively predicted by alcohol consumption by using MRBQ among Slovenian motorcyclists [16]. In Addition, Bui, *et al.* [17] indicated that MRBQ factors including speed violations, errors, as well as control errors were predictors of crashes among Vietnamese motorcyclists[17]. In another study, Uttra, *et al.* [18] attempted to create and verify a motorcycle riding behavior measurement model for a Thai population using MRBQ. A study was conducted all over India participating 392 motorcyclists [19]. Among the four factors revealed from MRBQ items, speed violation showed the highest mean score, and stunts showed the least mean score, respectively. However, traffic error was the most significant predictor of crash risk in this study [19]. Another study in India that investigated young motorcyclists, showed that near-crash experiences were positively associated with stunts and violations. As well, riders reporting more stunts and violations have received more fines [20]. Additionally, the examination of motorcycle riders in Colombia showed that speed violations were the strongest factors associated with at-fault crashes [21].

Two factors motivated the authors to conduct this study. Firstly, Iran is one of the few countries where motorcyclists represent a significant percentage of those killed in road accidents. Due to a large number of motorcycles in the country and their use for daily transportation and income, this issue exists. Second, Iran's cultural structure is different from those of other countries that have been the subject of similar studies in the past. Although Iranians maintain strong religious and traditional roots in their lives, they are also not far from modern civilization's manifestations. The combination of religious and traditional Islamic beliefs with involvement in modern western life has created a potential for discovering scientific approaches resulting from this unique lifestyle. Consequently, the current study has been conducted among motorcycle riders in Iran. We will be addressing the question of how lifestyle dimensions in a society like Iran can affect motorcyclists' behavior. The contributions of this study can be highlighted in two cases: (1) to the best of the author's knowledge, the relationship between the lifestyle and risky riding behavior of motorcyclists has been examined for the first time in this study (see Table 1); (2) It has rarely been found in previous studies to consider moral and religious (Islamic) factors as a subset of lifestyle on traffic behaviors. The relationships that have been investigated in this study.

2- Methodology

2- 1- Participants

A survey was conducted among 510 motorcyclists in three cities of Iran, including Tehran, Karaj, and Birjand. Upon reviewing the answers, 437 questionnaires were answered correctly. Data were gathered by trained students who received bonuses for their help. Motorcyclists were selected by a convenience method in their workplaces (e.g. moving freight) and along the urban streets. At the time of the break, they were asked to complete the questionnaire, and they were guaranteed obscurity and secrecy. Approximately 11 million motorcycles are registered in Iran, according to police statistics. It is estimated that 2.5 million motorcycles are in use in Tehran, Karaj, and Birjand, which constitute the entire statistical population in this study. In the case of a very large statistical population, Cochran's formula could be used. Based on Cochran's formula, the minimum statistical sample is calculated as 384. As mentioned earlier, 510 questionnaires were completed in the first stage during interviews with motorcycle riders. After removing incomplete questionnaires or with incorrect answers, 437 correct questionnaires were obtained and used in the model. According to Cochran's formula, this number is enough to be used in this study.

2- 2- Measures

The Motorcycle Rider Behavior Questionnaire (MRBQ) was used to measure aberrant riding behavior among motorcyclists. Elliott, *et al.* [3] introduced the MRBQ to operationally define and measure aberrant riding behavior among motorcyclists. Previous studies have also used this questionnaire [13, 19]. We added some common items among Iranian motorcyclists such as "cross junction while the traffic light is red", "riding in the opposite direction of the roadway", and "riding on the sidewalk". These changes were based on the Persian version of the MRBQ [12]. The participants responded on a 6-point scale ranging from 1 (never) to 6 (always).

Motorcyclists were also asked about the number of at-fault crashes in the last three years to assess the extent of their involvement in crash risk. Additionally, Socio-demographic items included age, marital status, educational degree (elementary school, junior high school, senior high school, bachelor's degree, master's degree, and Ph.D.), and years of riding

Table 1. Previous studies of MRBQ, crash involvement, and other factors that have been used in models

References	Year	Country	Sample	Analysis Method	Identified MRBQ factors	Crashes	Other factors
[3]	2007	United Kingdom	8666	Principle Component Analysis (PCA), Generalized linear modeling	5 factors (traffic errors, speed violations, stunts, safety equipment, and control errors)	Self-reported crash	-
[12]	2011	Iran	518	PCA, coefficient Pearson's correlation	6 factors (traffic errors, speed violations, stunts, safety violations, traffic violations, and control errors)	Self-reported crash	-
[13]	2012	Turkey	451	PCA, regression model	5 factors (traffic errors, speed violations, stunts, safety equipment, and control errors)	Self-reported crash data, Self-reported offense data	Theory of Planned Behavior
[14]	2014	Australia	2375	Confirmatory factor analysis and principal axis factoring, Zero-inflated Poisson regression model, and logistic regression model	4 factors(errors, speed violation, stunts, and protective gear)	Self-reported near crash and crash data, Police- reported crash and offense data	-
[15]	2017	Australia	470	Principal axis factoring, Logistic regression model	5 factors (traffic errors, speed violations, stunts, protective gear, and control errors)	Self-reported near crash and crash data, Self-reported traffic violation data	-
[16]	2018	Slovenia	205	Exploratory factor analysis, confirmatory factor analysis, SEM	7 factors (safety equipment, errors, stunts, helmet, clothing, speed violations, and alcohol)	Self-reported traffic accidents	Alcohol, Clothing, Helmet
[17]	2020	Vietnam	2254	Confirmatory factor analysis and principal axis factoring, Negative binomial regression	4 factors (traffic errors, speed, and alcohol-related violations, safety equipment, and control errors)	Self-reported traffic accidents and traffic violation data	-
[18]	2020	Thailand	1516	Exploratory factor analysis, confirmatory factor analysis, SEM	4 factors (traffic errors, stunts, safety equipment, and control errors)	-	Helmet wearing behavior
[19]	2021	India	392	Principal Axis Factoring, Negative binomial regression	4 factors (traffic error, control error, stunts, speed violation)	Self-reported near-crashes, Self-reported crashes, Self-reported violations	-
[20]	2021	India	300	Exploratory factor analysis, Univariate and multivariate binary logistic regression	5 factors (traffic errors, control errors, protective equipment, stunts, violations)	Self-reported near-crashes, Self-reported crashes, Self-reported fines	-
[21]	2021	Colombia	438	logistic regression model	5 factors (stunts, speed violations, traffic errors, control errors, and safety)	Self-reported near crashes, crashes, traffic tickets, and at-fault crashes	-
The current study	2022	Iran	437	PCA, SEM	4 factors (traffic violations, speed violations, errors, and stunts)	Self-reported at-fault crashes	Lifestyle factors

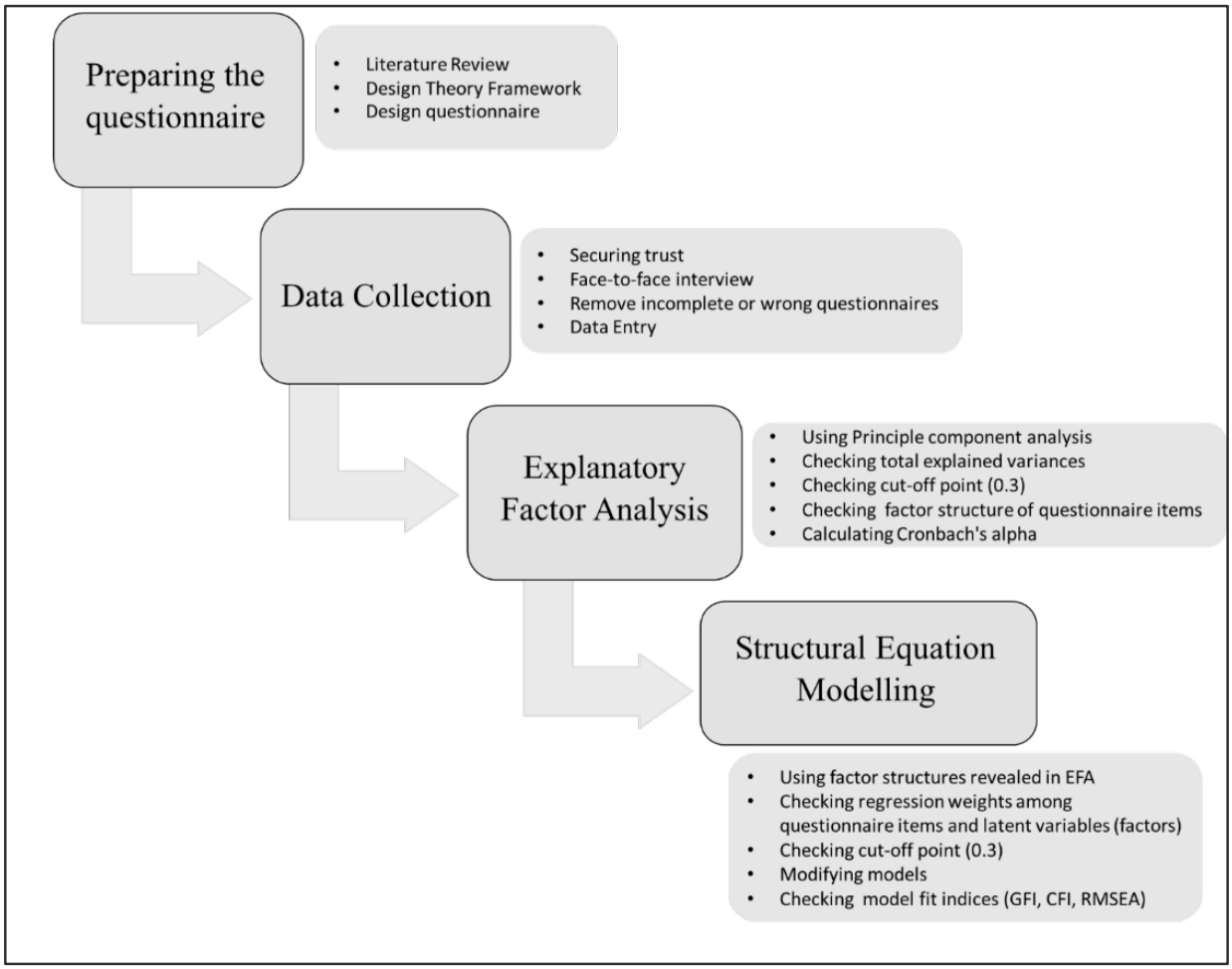

Fig. 1. Research methodology.

license for a motorcycle were gathered. The riding experience was assessed by using the number of years that they had held the riding license

Furthermore, lifestyle items were added to the questionnaire Items regarding culture, amusement, and motor hobby were taken from previous studies [9, 22]. Because of religious differences between Iran and other countries in the literature, we used an Islamic lifestyle measurement [23]. All items related to religion and morality in the current study have been suggested in Kaviani's [23] book. For this part of the questionnaire, a Likert scale with answers ranging from 1 (never) to 5 (almost always) was used.

2- 3- Data Analysis

A PCA was performed using iteration, the Kaizer criterion, and varimax rotation to determine the dimensionality of the lifestyle questionnaire and MRBQ. To calculate reliability indices, Cronbach's alpha coefficients were utilized.

Structural equation modeling (SEM) was applied to investigate whether lifestyle traits predicted aberrant motorcycle riding behavior and crashes. We evaluated the model fit using comparative fit indices (CFI), the goodness of fit indices (GFI), and root mean square error of approximation (RMSEA). Byrne [24] recommended a cut-off value of 0.90 for the GFI. When the RMSEA value is 0.05 or less, the model and data are well matched and 0.05 - 0.08 is considered close to a fit [25]. Kim and Bentler [26] recommended a CFI value between 0.90 and 0.95.

We have shown in Fig. 1, the process of conducting this study, focusing on the methodology section. Preparation of the questionnaire, data collection, explanatory factor analysis, and SEM were the main steps. The details of each step are listed in front of it.

2- 4- Sample characteristics

The socio-demographic characteristics of the study participants are shown in Table 2. The participants reported a mean age of 30.24 (S.D. =9.53) ranging from 18 to 69 years. Riding experience also ranged from 0 to 44 years and had an average of 8.15 years (S.D. =7.09) years. About 44% of participants had obtained a riding license for a motorcycle less than or equal to 5 years before the conduct of the survey. About 70% of participants had not entered the university and about 54% of them were unmarried.

Table 2. Socio-demographic characteristics of the sample.

Characteristics	No.	%	Mean (S.D.)
Age			30.24 (9.53)
18-24	141	33.65	
25-29	92	21.96	
30-39	116	27.68	
40-49	48	11.46	
50+	22	5.25	
Marital status			
Married	234	53.92	
Unmarried	200	46.08	
Educational degree			
Elementary school	30	7.23	
Junior High school	51	12.29	
Senior High school	202	48.67	
Bachelor Degree	117	28.19	
Master Degree and Ph.D.	15	3.61	
Possession of motorcycle riders' license (years)			8.15 (7.09)
Up to 5 years	185	44.05	
6-10	149	35.48	
11-15	40	9.52	
16+	46	10.95	

3- Results

3- 1- PCA for lifestyle items

Results of the PCA related to the lifestyle items have shown in Table 3. Five dimensions were found, which explained 47.49% of the total variance. All the item loadings were above 0.30. The first dimension accounted for 10.94% of the variance. This dimension included six items associated with cultural and voluntary activities, such as “reading books”,” listening to classical music”, and “ doing volunteer work and charity”. Therefore, this dimension was labeled “Culture”. 10.11% of the variance was explained by the second dimension, consisting of five items about the religious beliefs of motorcycle riders; thus this dimension was labeled “Religion”. The third dimension, which explained 9.05% of the variance, was labeled “motorcycle hobby” and consisted of three items such as “riding for achieving excitement”. The fourth dimension that explained 8.93% of variance included activities related to leisure time such as “going out for recreational purposes”. The fifth dimension accounted for 8.46% of the variance and was labeled “Morality”. The dimension included three items related to ethical actions such as “carefully performing duties”.

3- 2- PCA for the MRBQ

As shown in Table 4, PCA was performed on the motorcycle rider behavior questionnaire. This analysis revealed four dimensions which explained about 48.91% of the total variance. This analysis reflected that 15.49% of the total variance was explained by the first dimension. This dimension included eight items, in which six items were related to exceeding the speed limit. Therefore this dimension was labeled “Speed violations” and Cronbach’s alpha coefficient value was 0.86. The second dimension explained 12.71 % of the total variance with ten items, the majority of which were related to motorcycle riders’ errors; thus this dimension was labeled “Error” and the Cronbach’s alpha coefficient value for this dimension was 0.81. The third dimension accounted for 12.40% of the total variance, which consisted of items that were added to the Persian version of the MRBQ. These items were common among Iranian motorcycle riders and most of them reflected deliberate violations; thus this dimension was labeled “Traffic violations” and Cronbach’s alpha coefficient value for this scale was 0.81. Finally, the fourth dimension, which accounted for 8.32% of the total variance, included three items related to wheel spinning and racing with other

Table 3. PCA of the lifestyle questionnaire items

Items	Factor loading	Mean	S.D.
Culture (Cronbach's alpha = 0.65)			
Reading books	0.70	2.55	1.44
Doing writing	0.65	2.67	1.50
Walking for at least 20 minutes	0.65	3.17	1.54
Reading magazines or newspapers	0.58	2.98	1.48
Listening to classical music	0.51	3.11	1.49
Doing volunteer work and charity	0.41	2.73	1.37
Religion (Cronbach's alpha = 0.58)			
Participating in religious rituals	0.75	2.96	1.47
Inviting others to pray	0.74	3.23	1.36
Participating in political meetings	0.54	1.85	1.31
Thinking that it should be mandatory to use the hijab	0.47	3.64	1.31
Obeying religious orders in the relationship with the opposite gender	0.42	3.25	1.38
Motorcycle hobby (Cronbach's alpha = 0.66)			
Riding without a specific destination	0.82	2.22	1.38
Riding for achieving excitement	0.78	2.55	1.45
Riding with friends	0.65	2.61	1.37
Amusement (Cronbach's alpha = 0.56)			
Going out for recreational purposes	0.71	3.59	1.26
Traveling outside the province	0.71	2.39	1.04
Doing sports	0.55	2.83	1.62
Going to cinema	0.38	1.81	1.20
Morality (Cronbach's alpha = 0.55)			
Carefully performing duties	0.70	4.44	0.79
Acting modestly toward others	0.66	4.13	0.99
Adhering to promises	0.63	4.36	0.86

drivers. This scale was labeled “Stunts” and Cronbach’s alpha coefficient value was 0.83. The identified MRBQ factors can be divided into two categories: 1) errors and violations. Errors refer to failures to planned actions, and violations including speed violations, traffic violations, and stunts refer to deliberate infractions of traffic laws.

3- 3- Predicting motorcyclists’ aberrant riding behavior and at-fault crashes

In the current study, the relationships between lifestyle, riding behavior, and self-reported crashes were investigated using an SEM model. Fig. 2 shows the lifestyle factors (culture, religion, morality, and motor hobby) that relate to motorcycle riding behavior variables (traffic violations, speed violations, errors, and stunts) as well as at-fault crashes. Fig. 2 does not present paths that failed to achieve significance.

Fig. 2 indicates that traffic violations are negatively predicted by culture (β =-0.12). This means a unit increase in cultural activities such as reading a book can result in a 12% reduction in traffic violations such as carrying a large carriage with a motorcycle or crossing a red light. This study also revealed that motorcycle riders’ fun with their motorcycle has a significant and destructive effect on their riding behavior. Results showed that motor hobby has a direct relationship to the increased score of motorcyclists in the four factors of aberrant riding behavior. According to Fig. 2, one more unit of inclination in a motor hobby can cause a possible increase of 76% in stunts, 67% in speed violations, 64% in errors, and 66% in traffic violations. As an exploratory factor considered in this study, morality showed an interesting outcome. According to the model, motorcyclists’ stunts such as intentionally spinning their wheels or racing with other riders or drivers, can be negatively impacted by reinforcing their moral observances. As shown in Fig. 2, this impact could amount to as much as 76 percent (β =-0.76). Moreover, religion was negatively associated with traffic

Table 4. PCA of the motorcycle rider behavior questionnaire.

Items	Factor loading	Mean	S.D.
Speed violations (Cronbach's alpha = 0.86)			
Exceed the speed limit on a country/rural road	0.75	2.56	1.57
Exceed the speed limit on a motorway	0.74	2.31	1.50
Open up the throttle and just 'go for it on country roads	0.72	2.55	1.58
Exceed the speed limit on a residential road	0.70	2.22	1.42
Disregard the speed limit late at night or in the early hours of the morning	0.69	2.42	1.47
Carry a passenger who has not worn a helmet	0.65	3.37	1.86
Riding without helmet	0.63	2.76	1.71
Ride so close to the vehicle in front that it would be difficult to stop in an emergency	0.39	2.36	1.45
Errors (Cronbach's alpha = 0.81)			
The ride between two lanes of fast-moving traffic	0.66	2.23	1.08
Not notice someone stepping out from behind a parked vehicle until it is nearly too late	0.64	2.39	1.12
Attempt to overtake someone that the rider had not noticed to be signaling a right turn	0.61	2.33	1.17
Queuing to turn left on the main road, the rider pay such close attention to the main traffic that nearly hit the vehicle in front	0.61	2.45	1.17
Fail to notice that pedestrians are crossing when turning into a side street from the main road	0.53	2.51	1.18
Pull out onto the main road in front of a vehicle that the rider had not noticed, or whose speed have misjudged	0.53	2.19	1.27
Miss "Give Way" signs and narrowly avoid colliding with traffic having the right of way	0.52	2.27	1.22
Fail to notice or anticipate that another vehicle might pull out in front of the rider and have difficulty stopping	0.51	2.27	1.19
Distracted or pre-occupied, the rider belatedly realizes that the vehicle in front has slowed and the rider has to brake hard to avoid a collision	0.50	2.65	1.24
When riding at the same speed as other traffic, the rider found it difficult to stop in time when a traffic light turned against you	0.45	2.08	1.34
Traffic violations (Cronbach's alpha = 0.81)			
Carry a large carriage with a motorcycle	0.63	2.38	1.44
Cross junction while the traffic light is red	0.61	1.99	1.32
Skid on a wet road or manhole cover	0.61	2.45	1.44
A driver deliberately annoys the rider or puts him/her at risk	0.60	2.56	1.38
Riding with an impaired motorcycle	0.57	2.34	1.44
Riding on the sidewalk	0.57	2.09	1.25
Riding in the opposite direction of the roadway	0.56	1.96	1.21
Find that difficulty controlling the bike when riding at speed (e.g. steering wobble)	0.50	2.52	1.49
Carry more than one passenger with the motorcycle.	0.48	2.32	1.28
Use dipped headlights on the bike	0.33	3.45	1.73
Stunts (Cronbach's alpha = 0.83)			
Intentionally do a wheel spin	0.82	1.62	1.13
Unintentionally do a wheel spin	0.80	1.72	1.10
Get involved in unofficial 'races' with other riders or drivers	0.73	1.74	1.22

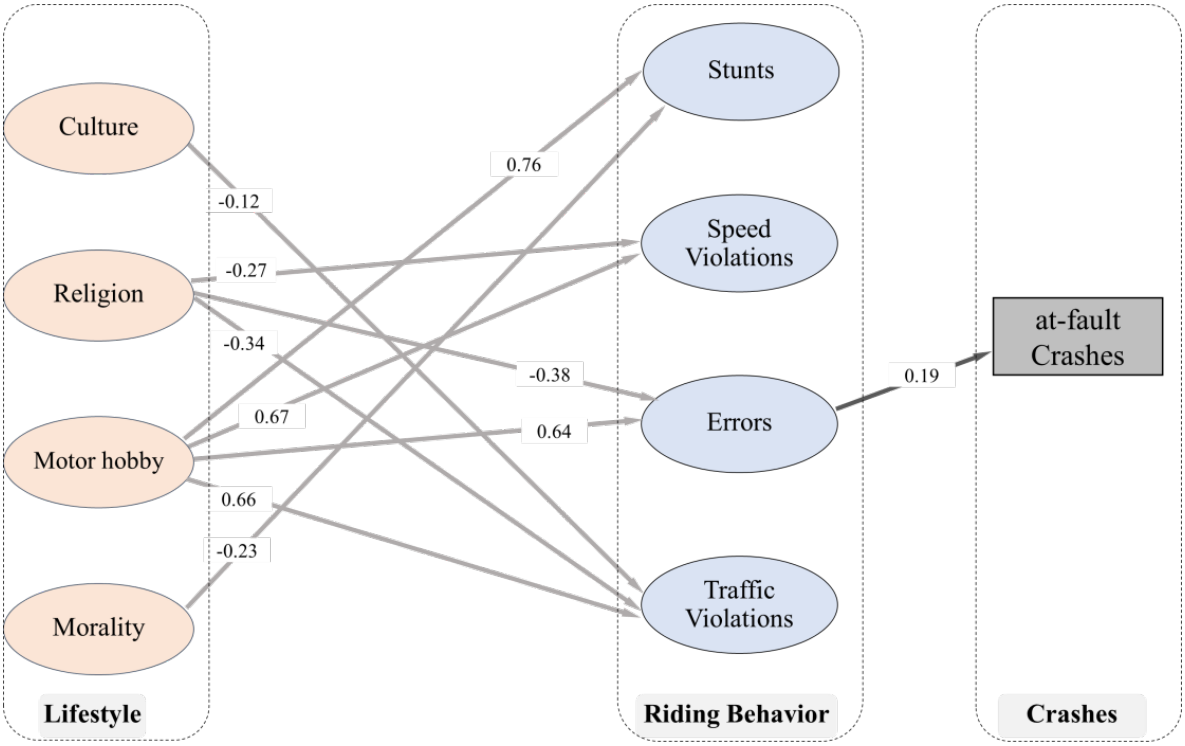

Fig. 2. The relationship between lifestyle factors, riding behavior factors, and at-fault crashes. Note: The standardized regression weights for the structural relations are shown.

violations (β =-0.34), errors (β =-0.38) and speed violations β =-0.27) as shown in Fig 2. This translates into a potential 34, 38%, and 27% reduction in traffic violations, errors, and speed violations respectively, when Iranian motorcyclists participate in more religious practices.

Throughout Table 5, the t-values (greater than 1.96) indicated significant relationships, and the model fit indices demonstrated satisfactory fit (RMSEA = 0.05, GFI = 0.88, CFI = 0.90).

4- Discussion

Motorcycles are one of the most popular modes of transportation in Iran, but simultaneously this mode is encumbered by high injury and fatality rates. The present study investigated potential relationships between lifestyle factors, aberrant riding behavior, and at-fault crashes among Iranian motorcyclists. Findings showed significant relationships between lifestyle dimensions and riding behavior factors.

Four riding behavior factors emerged from the MRBQ including traffic violations, speed violations, errors, and stunts, while Elliott, *et al.* [3], Özkan, *et al.* [13], and Ospina-Mateus, *et al.* [21] found five factors including speed violations, traffic errors, control errors, safety equipment, and stunts. Furthermore, Sakashita, *et al.* [14] found four factors among MRBQ items contained errors, speed violations, stunts, and protective gear, and Chouhan, *et al.* [19] showed MRBQ in speed violations, stunts, control errors, and traffic errors. Stephens, *et al.* [19] found a five-factor structure that included traffic errors, speed violations, protective gear, control errors, and stunts. Moreover, traffic errors, stunts, safety equipment, and control errors were four factors revealed in an explanatory study in Thailand [22]. Concerning some modifications to the MRBQ, in the present study, three factors including errors, speed violations, and stunts were under previous studies in Europe [3, 13] and Australia [14, 15]. Traffic violations as the fourth factor were similar to the previous study in Iran [12].

Results showed that culture negatively predicted traffic violations. Therefore, this relationship shows that the more a driver has cultural interests and activities, the less he commits violations. Chliaoutakis, *et al.* [8] support the negative relationship between culture and driver violations.

The aberrant riding behavior factors (except stunts) might also be negatively related to riders' religious beliefs. In line with Chliaoutakis, *et al.* [8] who found that ordinary violations (as a factor of driving behavior) were negatively predicted by religion as a factor of drivers' lifestyle. Religion was also shown to predict car drivers' errors and violations by Dabirinejad, *et al.* [27].

Further, motorcycle hobby positively predicted all the factors of riding behavior. According to Chliaoutakis, *et al.* [7], driving with no destination can increase the risk of a crash. Another study also has shown that driving without a destination predicted ordinary and aggressive violations as well as driver errors [18]. Morality was another lifestyle dimension that had a negative relationship with stunts. Similar results were reported in previous work, where moral norms negatively predicted car drivers' speeding behavior intention [28] or lane-discipline violations [29].

Table 5. Unstandardized regression weights of SEM.

Latent variables			Unstandardized Regression Weight	Standard Error	Critical ratio (t-value)	p-value
Exogenous	Direct effect	Endogenous				
Culture	---->	Traffic Violations	-0.1	0.05	-2.19	0.03
Motor Hobby	---->	Traffic Violations	1.15	0.22	5.29	***
Religion	---->	Traffic Violations	-0.63	0.15	-4.28	***
Morality	---->	Stunts	-0.37	0.1	-3.73	***
Motor Hobby	---->	Stunts	1.52	0.25	5.97	***
Motor Hobby	---->	Speed Violations	1.76	0.31	5.74	***
Religion	---->	Speed Violations	-0.73	0.19	-3.83	***
Motor Hobby	---->	Errors	0.99	0.19	5.3	***
Religion	---->	Errors	-0.61	0.14	-4.38	***
Errors	---->	At-fault Crashes	0.33	0.1	3.4	***

***: Significant at 0.001 percent (Two-tailed)

Another outcome of the current study was predicting at-fault crashes by motorcyclists' errors. This is in line with the study of Elliott, *et al.* [3] that found traffic errors and control errors predicted crashes. Stephens, *et al.* [15] also indicated that control errors increased the odds of near-crash involvement Also Chouhan, *et al.* [19] showed that Traffic errors are the main predictor of crash risk among Indian riders. However, Sakashita, *et al.* [14] indicated that errors may be associated with motorcycle crashes in addition to speed violations. Sumit, *et al.* [20] also showed that near-crash experiences were positively associated with stunts and violations in India. According to Bui, *et al.* [17], there is a similar association between control errors, traffic errors, and crashes among motorcyclists in Vietnam.

5- Conclusion

Study findings indicate significant relationships between lifestyle, riding behavior, and self-reported crashes. Using motorcycles for recreational purposes was found one of the main reasons for deliberate violations and errors conducted by motorcycle riders. Indeed, a large and detrimental effect of motorcycle riders' fun on their riding behavior was found in this study. Providing alternative ways for excitement-seeking stimuli could reduce the prevalence of aberrant motorcycle riding in the Iranian road traffic system. A good example of this is the development of special motorcycle tracks in different regions. Religion was a negative predictor of most riding factors. Morality was also related to fewer stunts. These results indicate that religious beliefs and respect for other people may have a positive effect on safe motorcycle riding especially in societies similar to Iran. It is necessary to emphasize that the great effect (up to 75% reduction) that morality had in preventing stunts was an interesting and new result in this study. This factor can be studied in future studies to see how it affects road safety. Moreover, the role of motorcyclists' errors (an unintended dimension of riders' behavior) in predicting crashes could be linked to the hard work of riders due to the economic crisis. Finally, more studies should be conducted regarding human factors, violations, and errors on motorcycle riders in low-and middle-income countries. Considering differences in the purposes of motorcycle riding and patterns of aberrant riding behavior in various countries is also an important avenue of future research.

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