

## Factors that cause anger among motorcyclists: exploratory factor analysis

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### ABSTRACT

Anger arising while riding a motorcycle is becoming a common problem on the road and it may be caused by many factors. The main objective of this study is to examine factors that could provoke anger among motorcyclists while riding. This study was based on self-reported questionnaires and comprised of 407 motorcyclists who owned valid riding licenses. exploratory factor analysis (EFA) indicated that the sample fit was suitable for factor analysis. In total, eight factors (unsafe or inappropriate actions, rude or sluggish actions, road conditions and design, police or enforces presence, illegal actions on the road, hazards on the road, rainy condition and obstruction on the road) with eigenvalues above 1.0 and 59 variables that ranged from 0.411 to 0.803, were generated. Cronbach's Alpha analysis indicated that all factors' values were greater than 0.60 and mean for all factors were reliable and had strength of consistency. This study provides the preliminary findings of factors and variables that could provoke riding anger among motorcyclists while on the road in the Malaysian context. The factors causing riding anger in this study have a similarity with driving anger factors that were developed by other countries and this indicates the validity of riding anger factors to provoke anger among motorcyclists on the road.

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## 1. INTRODUCTION

Motorcycles have become a mode of transport especially for those in the lower to medium income groups in Malaysia. They prefer to ride motorcycles to their workplace compared to driving as motorcycles are a cheaper mode of transport compared to other modes of transport. Furthermore, riding a motorbike is more convenient and the rider can avoid traffic jams during peak hours. However, motorcyclists are exposed to the risk of road crashes every day. In Malaysia, motorcyclists have been known to record the highest fatality rates in road accidents every year. In Malaysia, a total of 3,755 (59.7%) fatalities involved motorcyclists out of 6,284 deaths in 2018 [1].

Anger has been identified as a predictor of road crashes [2]; and significantly related to crash related conditions, such as near misses, loss of concentration, tailgating and losing control of vehicle [3]. Even, anger has a strong relationship with excessive speeds [4]. Drivers experienced high level of anger during situations such as impeding events, discourtesy, distracted behaviour performed by other drivers and during rush hour traffic [5].

Anger is an emotional state that may range in intensity from mild irritation to intense fury and rage [6]. Anger has physical effect including raising the heart rate and blood pressure and the levels of adrenaline and noradrenaline [2]. Motorcyclists and other road users are exposed to anger while riding on the road due to many factors. According to [7]; driving anger is related to risky driving behaviours, such as fast driving, reckless manoeuvres and violations of traffic laws. Research done by [8], [9]; showed the driving anger could increase the risk of road accidents. Furthermore, driving anger has a correlation with decision making, aggressive behaviours, perceived risks and impaired attention [10]–[14].

According to a study by [15]; on development of a driving anger scale, six reliable subscales involving hostile gestures, illegal driving, police presence, slow driving, discourtesy, and traffic obstructions were all correlated positively, suggesting a general dimension of driving anger as well as anger related to specific driving-related situations. Men were more angered by police presence and slow driving whereas women were more angered by illegal behaviour and traffic obstructions, but differences compensated so there were no gender differences on total score. Study highlighted that driving anger may have potential value for research on accident prevention and health psychology.

The relationship of driving anger and aggressive driving among drivers in China was studied by [16]. The driving anger scale (DAS) were developed based on the three subscales involving hostile gestures, arrival-blocking and safety-blocking. Hierarchical multiple regression applied to investigate the relationship of the propensity for angry driving scale (PADS) score with the demographic and three DAS subscales. Analysis indicated that age, gender and total driving distance were significantly influenced aggressive driving. Results also revealed that driving anger (hostile gestures and arrival-blocking subscale) become vital contributor to aggressive driving in China.

Study on driving anger extended by [17]; to validate the DAS for the driving anger of truck drivers in China. Survey data of 475 truck drivers was gathered to examine their aberrant driving behaviour. The structure of the DAS for truck drivers was examined using confirmatory factor analysis (CFA). Results found that one-factor structure of the DAS with 6 items had better fit for the sample of truck drivers in China. Demographic factors such as age, gender and driving experience were not significantly correlated with the aberrant driving behaviour of truck drivers.

Recent study on anger in road traffic was extended to cover cyclists' anger. Cycling anger scale (CAS) developed by [18]; based on 53 items that derived from common cyclists anger experiences. Confirmatory factor analysis retains 14 items for the developed CAS under four subscales including police interaction, cyclist interaction, car interaction and pedestrian interaction. In other studies [19]; adopted the CAS developed by [18]; to measure cyclists' anger in China. The relationship of cycling anger with their demographic and other factors were also examined. Age, gender and education background were found insignificant with the CAS. Risky and aggressive riding by cyclists in China have significant correlation with cycling anger. Cyclist anger and aggression studied by [20]; found that interaction with drivers become the provoking situations for cyclists, than other cyclists and pedestrians.

Majority of existing research on road anger highlighted that anger by different road users differ across the source of provocations [17]–[22]. Factors of provoking anger were explored for car drivers [5], [23]; buses and taxi [24]; trucks [17]; and also cyclists [18]–[20]. However, limited research attention given to explore the factors provoking riding anger experienced by motorcyclists, although motorcycle crash become the largest group of road fatalities in Malaysia and other Asian countries. Riding anger might differ from driving anger or cycling anger, and the experience and risks faced by motorcyclists may be different from drivers and cyclists. Motorcyclists riding on the road are directly exposed to surrounding factors such as adverse weather, objects on the road, noise, hazards, and heat. Hence, this study is important to find out what causes anger among motorcyclists while riding. Therefore, this study explores the factors for motorcyclists riding anger using questionnaire that adapted and adopted from the driving anger scale (DAS) structure.

## **2. RESEARCH METHOD**

### **2.1. Participants**

This study involved 407 participants from Klang Valley (Central of Peninsular Malaysia). The target population for this study comprised of motorcyclists who were employed and who owned valid riding licenses. The mean aged for participants was 35 years old ( $SD=9.31$ ) and the mean for riding experience was 16 years ( $SD=8.60$ ). The demographic information of the participants is summarised in Table 1.

Table 1. Demographic

Item	Frequency	%
<b>Gender</b>		
Male	352	86.5
Female	55	13.5
<b>Marital status</b>		
Single	116	28.5
Married	282	69.3
Divorce/Widow	9	2.2
<b>Type of motorcycle</b>		
Not more than 250sp	388	95.3
Not more than 500sp	7	1.7
More than 500sp	12	2.9
<b>Education level</b>		
Low	6	1.5
Middle	193	47.4
High	208	51.1
<b>Employment</b>		
Private sector	123	30.2
Public sector	284	69.8

## 2.2. Materials

The questionnaire was adapted and adopted from driving anger scale (DAS) [15], to measure the self-reported questionnaire of riding anger among motorcyclists and prepared in Bahasa Malaysia. The study done by [15] identified six subscales and 33 driving anger items (alpha reliability=0.90). The six subscales include hostile gestures, illegal driving, police presence, slow driving, discourtesy and traffic obstructions. For this study, 59 items and eight subscales were formed based on the scenario and situations that were usually faced by motorcyclists in Malaysia. The 59 items were grouped under eight subscales, namely unsafe or inappropriate actions (14 items), rude or sluggish actions (9 items), road conditions and design (11 items), police enforcers' presence (5 items), illegal actions on the road (6 items), hazards on the road (5 items), rainy conditions (5 items) and obstructions on the road (4 items). There are some similarities in the subscales for this research and research done by [15] such as "police presence", "illegal driving", "traffic obstruction" and hostile gesture". However, there are a number of additional subscales in this study that were not included in the study done by [15], such as "rainy condition", "road condition and design" and "hazard on the road". These subscales included in this study were based on scenarios that frequently occurred in the Malaysia context and might differ from other countries such as weather and culture. Rating rates for this study were based upon a five-point scale (1=not angry, 5=very angry). Participants were asked to rate how angry they would become if they came across various situations likely to provoke anger while riding.

## 2.3. Procedure

The questionnaire was distributed to eight companies including private and government sectors in year 2019. Letters of consent were obtained from the companies or organizations concerned. Once we got the approval from the companies or organizations, the participants were approached at work for data collection. Participants gathered at the hall or meeting room prepared by the employers to fill up the questionnaires. The instructions were given to them on how to answer the questionnaires and respondents had the opportunity to seek clarification if needed. Consent to participate was sought from each respondent prior to the commencement of the data collection. The whole process took about 20 minutes.

## 2.4. Data analysis

Data collected from this research was analyzed using statistical package for social science (SPSS) software and structural equation modeling (SEM). SEM assess through exploratory factor analysis (EFA) using SPSS. EFA was used to determine the latent or factor structure of the set of variables from a principal component analysis (PCA) with Varimax rotation. Varimax rotation assumes that factors are uncorrelated to each other. SPSS also used descriptive analysis such as mean, percentage, standard deviation and cronbach's alpha (CA).

## 3. RESULTS AND DISCUSSION

### 3.1. Exploratory factor analysis (EFA)

Based on Table 2, the results of the EFA suggested that the Kaiser-Meyer-Olkin Measure of Sampling Adequacy was 0.952 and the communalities ranged from 0.40 to 0.73 indicating that the sample was adequate and suitable for factor analysis. Bartlett's Test of Sphericity gave a p-value of <0.001. The  $\chi^2$  for this model was 15,184.34 degree of freedom is 1.770.

Eight factors with eigenvalues above 1.0 were generated, which explained about 59.567% of the total variance as shown in Table 2. The communalities' value for the 59 variables ranged from 0.474 to 0.763, above the suggested threshold value of 0.30 for practical and statistical significance [24]. Meanwhile, the factor loadings for the 59 variables ranged from 0.411 to 0.803 and shows a value above the threshold ( $>0.40$ ) [25]. Factor one is 'unsafe or inappropriate actions', consisting of 14 items related to another rider such as changing lanes when near and driving too close, changing lanes suddenly without signalling and stopping suddenly, driving in the opposite lane without lowering the high beam at night, increasing speed when overtaking, driving fast beside a motorcycle and showing an offensive sign, entering or exiting from the other/opposite side. It explained the 34.56% of the variance in the data, with an eigenvalue of 20.733. The mean values of items ranged from 4.570 to 4.020.

Table 2. Total variance explained

Component	Total	Initial eigenvalues	
		% of variance	Cumulative %
1	20.733	34.555	34.555
2	5.040	8.401	42.955
3	2.626	4.376	47.332
4	1.776	2.960	50.292
5	1.710	2.850	53.141
6	1.410	2.349	55.491
7	1.261	2.102	57.592
8	1.185	1.975	59.567

Kaiser-Meyer-Olkin measure of sampling adequacy (0.952), Bartlett's test of sphericity (15184.342) degree of freedom (1.770), significant (0.000)

Factor two is 'rude or sluggish actions,' and composed of 9 items, all closely related to someone's action such as giving an unhappy look, honking, stepping on the gas pedal vigorously while waiting at the traffic light, flashing the high beam, shouting, taking too long to go into the parking bay, driving too slowly, crossing too slowly and a driver in front taking his sweet time to move when the light turns green. This accounted for about 8.40% of the total variance, with an eigenvalue of 5.04. The values of factor loadings ranged from 0.411 to 0.684.

Factor three, 'road conditions and design', was represented by 11 items, all closely related to environment on or along the road such as a tree branch blocking the rider's view, a drain or manhole without a cover too close to the motorcycle, crossing a sandy patch on the motorcycle road shoulder, confusing road signage, signage too close to the road or no proper signage, hitting a pot-hole or puddle on the road and crossing slippery road paint, traffic light not functioning and motorcycle lane or road shoulder not provided. It explained approximately 4.37% of the variance, with an eigenvalue of 2.63.

Factor four is 'police or enforcers presence or road blocks, enforcers ordering you to stop your vehicle, enforcers driving close, enforcers observing you from a hidden position and enforcers ordering you to give way to very important person (VIPs). It represented about 2.96% of the total variance in the data, with an eigenvalue of 1.78. The 6 items formulating factor five 'illegal actions on the road', were all closely related to someone's action such as making illegal U-turns, using a mobile phone while driving or riding, over taking at a double line, driving or riding beyond the speed limit, beating the traffic light or stop signage and driving/riding against the traffic. It had an eigenvalue of 1.71, accounting for around 2.85% of the total variance.

Factor six, 'Hazards on the road,' referred to being struck by a torn piece of tire from a vehicle in front, object falling from a vehicle, an animal crossing the road suddenly, another vehicle squeezing into the lane due to closure or narrowing of road and being hit by a flying stone from the tyre of another vehicle. Approximately 2.35% of the variance was captured by factor six that had an eigenvalue of 1.41. Factor seven is about 'rainy conditions, which considered being caught in a traffic jam and no shelter available during rain, being compelled to stop at a pedestrian pass/overhead bridge and getting splashed by rain water. It reflected around 2.10% of the total variance with an eigenvalue of 1.26.

Factor eight is 'obstructions on the road' which described riding behind a vehicle spewing thick smoke, vehicle stopping at road shoulder or emergency lane without signalling, riding behind a lorry carrying extra-long materials and vehicle obstructing road in front during heavy traffic. It reflected around 1.98 percent of the total variance with an eigenvalue of 1.19.

### 3.2. Cronbach's alpha and mean analysis

Based on Table 3, Cronbach's Alpha Analysis indication for the constructs were all greater than 0.60. Unsafe or Inappropriate actions (0.926), rude or sluggish actions (0.904), road conditions and design

(0.910), police enforcers presence (0.896), illegal actions on the road (0.835), hazards on the road (0.777), rainy condition (0.874) and obstructions on the road (0.719). The mean value indicate that all factors show reliabilities and strength of consistency.

Tables 3 dan 4 (see Appendix) shows mean analysis of all items and eight factors. All items and factors which show a mean value above 2.5 is considered as anger. Unsafe or inappropriate actions indicated a mean value higher than other factors (4.281) consists of items “driver swerves left/right without signaling”, is the highest mean value (4.570), followed by “someone changes lane suddenly without signaling” (4.540). Meanwhile, the item with the lowest mean value is “someone enters/exits from your path” (4.020).

Secondly, illegal actions on the road (4.252) referring to “someone driving/riding against the traffic” (4.680) has the highest mean value, while the lowest is for “someone driving or riding beyond the speed limit” (3.740). Thirdly, obstructions on the road (4.004) referring to “vehicle stopping at road shoulder /emergency lane without signaling” has the highest mean and the item “riding behind a lorry carrying extra-long materials” has the lowest mean among the items.

Road conditions and design is the fourth factor. The highest mean value for this category is for “a drain or manhole without a cover too close to the motorcycle lane/road shoulder” (4.040) and the lowest mean is for “motorcycle lane/road shoulder not provided” (3.470). Fifthly, hazards on the road with the highest mean is for the item “another vehicle squeezing into your lane due to closure or narrowing of road” (4.110) and the lowest is for “an animal crossing the road suddenly” (3.100).

The Mean and S.D for the sixth factor, “rude or sluggish actions” was 3.473 (0.904). The variables such as “someone shouting at you” (3.990) has the highest mean value, followed by “someone giving you an unhappy look” (3.640). The lowest mean value is “a pedestrian crossing too slowly while you are waiting at a pedestrian crossing” (2.760). The seventh factor is rainy condition where “getting splashed by water from a puddle by a passing vehicle” has the highest mean value and “compelled to stop at a pedestrian crossing when there is no pedestrian” has the lowest mean value. Lastly, “police enforcers presence” had the lowest mean value (2.779) among all subscales. The item “traffic police or road enforcers ordering you to give way to “VIPs” (3.200) has the highest mean value and “traffic police/road enforcers driving close to you” has the lowest mean value of the item police enforcers presence.

Table 3. Mean and cronbach's alpha of factor

Factors	Mean	Cronbach's Alpha
Unsafe/Inappropriate actions	4.281	0.926
Rude/sluggish actions	3.473	0.904
Road conditions and design	3.796	0.910
Police enforcers presence	2.779	0.896
Illegal actions on the road	4.252	0.835
Hazards on the road	3.705	0.777
Rainy Condition	3.246	0.874
Obstructions on the road	4.004	0.719

## 4. DISCUSSION

### 4.1. Factors provoking riding anger of motorcyclists

The aim of this study was to examine the factors that could provoke anger among motorcyclists while riding. The riding anger among motorcyclists was examined utilizing the self-reported questionnaire that was adapted and adopted from DAS [15]. Additional three subscales included in this study to cater the scenario and situations that were usually faced by motorcyclists in Malaysia: rainy condition (5 items), road condition and design (11 items) and hazard on the road (5 items). In total, eight subscales with 59 items were used to examine riding anger factors in this study.

Based on results in Table 3, motorcyclists in this study reported the most important factor of riding anger was the unsafe or inappropriate actions. The highest mean scores anger-provoking situations for motorcyclists under subscale “unsafe or inappropriate actions” involved items “driver swerves left/right without signaling” (mean=4.570), “someone changes lane suddenly without signaling” (mean=4.540), and “vehicle using the emergency lane/road shoulder during heavy traffic” (mean=4.500). The results indicate that motorcyclists are more likely get anger when unsafe actions by other road users would thread their safe path while riding on road.

The Malaysian motorcyclists also reported an exceptionally high level of riding anger evoked by illegal actions. Comparing with previous research on driving anger under subscale “illegal driving” showed that the Mean and S.D in China was 2.64 (0.78) [25]; France 3.02 (1.33) [26]; Turkey 3.50 (0.88) [27]; Spain 3.46 (0.88) [28]; New Zealand 3.28 (0.97) [29]; and Malaysia 2.75 (0.95) [3]. This study showed that the Mean and S.D under “illegal action” was 4.252 (0.835) which was the second highest Mean among eight

subscales. The findings showed that the subscale “illegal action” was higher among riders compared to drivers which were done by previous researchers.

Other unsafe or illegal actions by other road users such as making an illegal U-turn, changes lane when too close, beating the traffic light/stop signage, using a mobile phone while driving/riding, vehicle in front stops suddenly and pedestrian coming into your path suddenly also tend to provoke anger to motorcyclists. These unsafe and illegal actions by other road users created unexpected situations for motorcyclists to react with a safe distance in avoiding collision. Comparing with other findings on anger, situation like beating the traffic light/stop signage or speeding when you try to overtake only caused lower anger to professional drivers [24]; however caused higher anger among motorcyclists.

The third important factors that might provoke riding anger was the obstructions on the road with mean value of 4.004 (0.719). Obstruction due to the stopped vehicle at road shoulder or emergency lane without signaling has the highest mean since this situation might lead to the rear-end collision for motorcyclist. Rear end collision with higher fatality rate was expected when the front vehicle stopped, either on the roadside or on the shoulder or at traffic light [30].

Mean for the factor under subscale “rude or sluggish actions” was 3.473 (0.904). The highest mean value variables were “someone shouting at you” (mean =3.990), followed by “someone giving you an unhappy look” (3.640). The lowest mean value is “a pedestrian crossing too slowly while you are waiting at a pedestrian crossing” (2.760). Comparing the Mean and S.D on driving anger under subscale “hostile gestures” in France were 3.36 (1.27) [26]; Turkey 3.42 (0.96) [27]; Spain 2.68 (1.07) [28]; and Malaysia 3.45 (1.09) [3]. In contrast, factor related to the hostile gestures, or rude were not considered for the cycling anger [18].

Factors related to the “rainy condition” become less important in provoking riding anger with mean value of 3.246 (0.874). Item with the highest mean value under subscale “rainy condition” was “getting splashed by water from a puddle by a passing vehicle” (mean=3.830). This situation might cause an obstruction to motorcyclists’ view while riding in rainy day from the puddle splashed by other vehicles, and cause discomfort for motorcyclist to get wet and dirty. Compared to other items, getting splashed due to rainy conditions was rated as factors that provoke moderate level of riding anger since it was an expected situation for motorcyclists when riding during raining.

The least important factor that led to riding anger were and “police enforcers presence” with mean value of 2.779 (0.896). The Mean and S.D on driving anger under subscale “police presence” were 1.85 (1.11) in France [26]; 2.22 (0.98) in Turkey [27]; 2.00 (0.99) in Spain [28]; 1.86 (0.86) in New Zealand [29]; and 2.25 (0.98) in Malaysia [3]. This indicates that previous studies and this study have similarities whereby “police presence” showed the lowest subscale to provoke anger among drivers or riders.

#### 4.2. Implications and future directions

Findings from this study successfully identified the important factors in anger-provoking events for motorcyclists. The exploratory factor analysis (EFA) results indicate that the eight factors tested are reliable and have a strength of consistency: unsafe or inappropriate actions, rude or sluggish actions, road conditions and design, police or enforces presence, illegal actions on the road, hazards on the road, rainy condition and obstruction on the road. The anger experienced by motorcyclists reflect the feeling of high risk of being involved in road crashes in a mix traffic environment. Understanding riding anger of motorcyclists provides evidence of the provoking events to aggressive and risky riding behaviours such as tailgating, speeding, loss of concentration and close overtaking. As such, the findings from the current study provided important implications for road safety, physical health, and well-being by increasing awareness and safety between drivers and riders, creating a measure of riding anger, and paving the path for future research to explore on the road user anger. Specifically, it could provide the government and stakeholders with a better understanding of the factors that cause anger among Malaysian motorcyclists.

This study utilised 59 items that adapted and adopted from established DAS to examine the factors that provokes riding anger of motorcyclists. To the best of our knowledge, the instrument to measure riding anger scale (RAS) for motorcyclists is still missing from literature. Thus, the 59 items tested in this study may contribute as a theoretical basis for the development of the RAS. It can be improved by examining which factor is most dominant in causing anger among motorcyclists using confirmatory factor analysis (CFA). Future studies on the factor structure of RAS will provide more comprehensive information and can be used to determine which factor needs to be tackled first and to come up with the appropriate strategy to be employed to overcome this issue.

As this study was conducted in Malaysia, thus, it should be conducted in other countries to see the cultural differences in riding behaviour. Extension of this study is expecting to provide initial crucial knowledge on the factor structure of the RAS, so that an effective measure can be strategies to reduce riding anger of motorcyclists in Asian countries. In the future, research effort should be made to investigate the relation of the riding anger with the aberrant riding behaviours of motorcyclist. Findings from the study may

be useful for transportation safety researchers in investigating how the riding anger of motorcyclists is affected by other factors and how that anger influences accidents related to motorcycle.

## 5. CONCLUSION

This study measured the causes of riding anger which were collected from a sample of 407 motorcyclists in Klang Valley. The questionnaires comprised of 59 situations that are likely to provoke anger while riding a motorcycle. The data collected was grouped into eight riding anger subscales, namely, unsafe or inappropriate actions, rude or sluggish actions, road conditions and design, police enforcers presence, illegal actions on the road, hazard on the road, rainy condition and obstructions on the road. Exploratory factor analysis (EFA) results showed that all the factors had eigenvalues above 1.0 and total variance was 59.67. The communalities value for the 59 variables ranged from 0.474 to 0.763. Meanwhile, the factor loadings for the 59 variables ranged from 0.411 to 0.803. In conclusion, all eight factors examine have values were greater than 0.60 and mean for all factors were reliable and had strength of consistency. Above all, Factor 1 under sub scale 'unsafe or inappropriate actions' rated as the most anger-provoking situations for motorcyclists in Malaysia. The result from this study provides important insight into the nature of anger in riding experiences by motorcyclists.

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## APPENDIX

Table 4. Exploratory factor analysis, mean analysis of item and cronbach's alpha if item deleted (*Continue*)

	Factor/Item	Loading	Communality	Mean	Standard deviation	Cronbach's Alpha if item deleted
Factor 1: Unsafe/Inappropriate actions						
1.	Someone changes lane when too close	0.711	0.674	4.220	0.861	0.917
2.	Someone changes lane suddenly without signalling	0.696	0.652	4.540	0.771	0.920
3.	Driver swerves left/right without signalling	0.689	0.625	4.570	0.736	0.921
4.	Someone driving in the opposite lane without lowering his high beam at night	0.675	0.627	4.290	0.848	0.920
5.	Someone driving at the back of your motorbike using high beam at night	0.668	0.572	4.160	0.883	0.921
6.	A vehicle in front not giving you way although you have turned on your signal	0.611	0.621	4.200	0.923	0.919
7.	Someone driving too close your motorbike	0.606	0.550	4.030	0.902	0.921
8.	A vehicle in front stops suddenly	0.604	0.506	4.440	0.843	0.921
9.	Someone increases his speed when you are trying to overtake	0.578	0.572	4.040	0.919	0.920
10.	A vehicle using the emergency lane/road shoulder during heavy traffic	0.577	0.567	4.500	0.821	0.922
11.	A heavy vehicle being driven fast beside your motorbike	0.568	0.544	4.110	0.985	0.922
12.	Someone showing an offensive sign at you	0.482	0.531	4.340	0.994	0.923
13.	A pedestrian coming into your path suddenly	0.478	0.504	4.210	0.922	0.922
14.	Someone enters/exits from your path	0.415	0.475	4.020	0.972	0.923
Factor 2: Rude/ sluggish actions						
1.	Someone giving you an unhappy look	0.684	0.672	3.640	1.173	0.887
2.	Someone honking at you	0.674	0.608	3.500	1.096	0.893
3.	Someone stepping on the gas pedal vigorously while waiting at the traffic light	0.672	0.602	3.470	1.157	0.892
4.	Someone flashing the high beam in your direction	0.660	0.572	3.360	1.205	0.894
5.	Someone shouting at you	0.605	0.591	3.990	1.054	0.896
6.	Someone taking too long to go into the parking bay	0.599	0.592	3.400	1.096	0.888
7.	Someone ahead of you driving too slowly	0.549	0.568	3.530	1.118	0.891
8.	A pedestrian crossing too slowly while you are waiting at a pedestrian crossing	0.467	0.569	2.760	1.202	0.899
9.	A driver in front taking his sweet time to move when the light turns green.	0.411	0.551	3.610	1.115	0.894
Factor 3: Road conditions and design						
1.	A tree branch blocking your view in the motorcycle lane/road shoulder	0.717	0.692	3.740	1.031	0.898
2.	A drain/manhole without a cover too close to the motorcycle lane/road shoulder	0.666	0.652	4.040	1.034	0.900
3.	Crossing a sandy patch/object in the motorcycle lane/road shoulder	0.662	0.667	3.780	1.035	0.900
4.	Hitting a pot-hole/puddle on the road	0.610	0.520	3.980	1.034	0.904
5.	Crossing slippery road paint	0.603	0.586	3.690	1.057	0.899
6.	Road surfacing is much higher than land/shoulder level	0.563	0.546	3.660	1.061	0.901
7.	Road works or diversion without proper signage	0.534	0.521	3.980	1.024	0.904
8.	Traffic light is not functioning	0.522	0.581	3.760	1.061	0.903
9.	Confusing road signage	0.520	0.574	3.890	0.993	0.905
10.	Motorcycle lane/road shoulder not provided	0.516	0.603	3.470	1.047	0.904
11.	Signage/ obstruction too close to the motorcycle lane/road shoulder	0.508	0.536	3.760	0.984	0.902
Factor 4: Police enforcers presence						
1.	Road block by traffic police/road enforcers	0.803	0.748	2.710	1.333	0.862
2.	Traffic police/road enforcers ordering you to stop your vehicle	0.790	0.763	2.600	1.259	0.863
3.	Traffic police/road enforcers driving close to you	0.787	0.758	2.540	1.229	0.864
4.	Traffic police/road enforcers observing you from a hidden position	0.765	0.702	2.850	1.317	0.871
5.	Traffic police/road enforcers ordering you to give way to VIPs	0.734	0.623	3.200	1.447	0.907
Factor 5: Illegal actions on the road						
1.	Someone making an illegal U-turn	0.638	0.637	4.390	0.880	0.799
2.	Someone using a mobile phone while driving/riding	0.630	0.557	4.350	0.855	0.811
3.	Someone over taking at a double line	0.612	0.598	4.150	0.915	0.806
4.	Someone driving/riding beyond the speed limit	0.601	0.593	3.740	1.072	0.825
5.	Someone beating the traffic light/stop signage	0.563	0.584	4.200	0.945	0.800
6.	Someone driving/riding against the traffic	0.560	0.602	4.680	0.681	0.813

Table 4. Exploratory factor analysis, mean analysis of item and cronbach's alpha if item deleted (*Continue*)

Factor/Item		Loading	Communality	Mean	Standard deviation	Cronbach's Alpha if item deleted
Factor 6: Hazards on the road						
1.	Struck by a torn piece of tyre in front of your vehicle	0.764	0.701	3.820	1.100	0.689
2.	Object falling from a vehicle in front of you	0.655	0.597	4.020	1.010	0.735
3.	Another vehicle squeezing into your lane due to closure/narrowing of road	0.580	0.498	4.110	1.001	0.759
4.	Being hit by a flying stone from the tyre of another vehicle	0.563	0.564	3.470	1.157	0.744
5.	An animal crossing the road suddenly	0.533	0.485	3.100	1.155	0.746
Factor 7: Rainy condition						
1.	Caught in a traffic jam during rain	0.644	0.743	3.080	1.215	0.824
2.	Compelled to stop at the traffic light during rain	0.642	0.725	3.060	1.249	0.834
3.	No shelter available during rain	0.584	0.646	3.360	1.172	0.858
4.	Compelled to stop at a pedestrian crossing when there is no pedestrian	0.578	0.684	2.900	1.274	0.837
5.	Getting splashed by water from a puddle by a passing vehicle	0.462	0.578	3.830	1.024	0.876
Factor 8: Obstructions on the road						
1.	Riding behind a vehicle spewing thick smoke	0.682	0.600	3.870	1.008	0.620
2.	Vehicle stopping at road shoulder/emergency lane without signalling.	0.557	0.540	4.260	0.947	0.658
3.	Riding behind a lorry carrying extra-long materials	0.535	0.481	3.780	1.090	0.656
4.	Vehicle obstructing road in front during heavy traffic	0.500	0.474	4.110	0.899	0.691

Principal component analysis. Rotation method: Varimax with Kaiser Normalization