



## Review Article

# Driving Anger Among Pakistanis: Gender Differences and Demographic Predictors

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Driving anger is a psychologically and socially relevant construct that has a strong relationship with aggressive driving behavior, road traffic accidents, and the general implications on the health of the population. The current study explored the anger in driving among a group of 500 Pakistani drivers (n = 293 men, n = 207 women) who have applied the abbreviated version of the Driving Anger Scale (DAS-14). Possible predictors were demographic variables: age, years of education, whether the motorbike or car is the primary vehicle used, and the hours of daily driving. In this cohort, DAS-14 showed better internal consistency ( $\alpha = .97$ ). The gender difference appeared statistically significant as the men participants expressed significantly higher driving anger scores than women participants,  $t(498) = 9.65, p < .001, d = .88$ . Pearson correlations showed negativity of age ( $r = -.36, p < .001$ ) and education ( $r = -.33, p < .001$ ) with driving anger and positivity of daily driving hours ( $r = .41, p < .001$ ). The multiple linear regression showed that the model explained 42.7 per cent of the driving anger variance,  $F(5, 494) = 73.52, p < .001$ . Independent predictors were found to include gender, age, and hours per day as a driver, vehicle type, and education were not found to be conventional predictors in the entire model. The results have been presented with reference to the cultural, developmental, and situational contexts of the Pakistani society, and this has been applied to road safety policy and psychological interventions.

**Keywords:** Driving anger; Driving Anger Scale; Gender differences; Age; Pakistan; Road safety; Aggressive driving**Introduction**

Road traffic accidents is at the forefront of the public health concerns during modern times. The World Health Organization states that an average of 1.191 million people die each year on roads in the world, and many more deaths are reported every year. Traffic mortality is disproportionately distributed with a higher share of the world road mortality being attributed to low and middle income states, which have over 90 percent of the total motor vehicles, a disproportionate burden of the urban and rural congestion. Pakistan is an illustration of a seriously afflicted state in South Asia, where the motor vehicle accidents are the major cause of mortality and disability through injuries. It is estimated that more or less 25,000 people die annually in Pakistan, and the

number of severe injuries is much higher, thus leaving a significant economic and social burden on the developing state [1].

Behavioral and psychological variables have gained more popularity among traffic psychologists, researchers in the field of public health, and policymakers in the discussion of these trends. The traditional proximal factors of road accidents that include speeding, impaired driving, and violation of the traffic laws are well known; however, emotional conditions of drivers, especially the state of anger, have become the most important distal factors of risky and violent driving [2, 3]. The concept of driving anger is the anger that arises in a person when they are driving as a reaction to the aggressive or irritating stimuli that occurred on the road. Driving anger is also differentiated by generalized irritability or dispositional anger and has been found to be a predictor of diverse dangerous behaviors, such as tailgating, aggressive passing, verbal aggression, obscene hand gestures, and in some extreme instances,

physical confrontations with other road users [4, 5].

Driving anger is mostly based on two frameworks. Both the frustration-aggression hypothesis [6] and the cognitive-neoassociation theory [7] believe that driving anger is a result of a combination of environmental stimuli and personal appraisals. In a traffic situation, which involves congestion, lack of control, perceived unfairness, and goal interference, there are many provocations which drivers face and thus become frustrated and, in turn, aggressive [8]. The cognitive appraisal models also highlight the importance of hostile attributional prejudices, in which the ambivalent behavior of other drivers is seen as premeditated and evil [9, 10]. Taken together, all these models assume that driving anger is a psychologically relevant construct whose behavioral implications are real.

Driving Anger Scale was created as a psychometric measure originally to measure the scale of anger within driving contexts. The original 33-item scale measured six dimensions as hostile gestures, illegal driving, police presence, slow driving, discourtesy, and traffic obstructions. Later factor analyses and feasibility evaluations resulted in the development of an improved 14-item short version DAS-14 [4] which still possesses the psychometric characteristics of its predecessor, but can be given more easily. The DAS-14 has been successfully validated in Chinese [11], Turkish [12], Colombian, and German populations [13]. Across studies, driving anger consistently predicts aberrant and aggressive driving behaviors, though found the relationship stronger in China than Western countries. The scale reliably measures driving anger as a personality trait related to general anger expression.

Gender is considered to be one of the most actively studied correlates of driving anger. The existing empirical research, most of which happens to be based on western samples, indicates that men indicate higher levels of driving anger and are more likely to actualize their anger through expressing open-hostility driving behavior [4, 13-15]. There are a number of explanatory models proposed that explain this gender gap. According to social learning theory [16], men are socialized at a tender age to be more visible in their anger especially in a competitive and social context like in driving. Evolutionary views assume that male aggressiveness even on the road can be a dominance-seeking activity and a show of territorial reactions to perceived threat [17]. Further, according to risk-compensation theory, men are more likely to be involved in risky driving behavior because they perceive themselves as better drivers and thus enhance anger when their perceived superiority in driving is endangered by the behavior of other drivers [2].

The generality of the gender difference in precipitating anger has been challenged especially in the non-Western cultural set-ups. Varies and non-existent gender difference are also reported in studies across the Middle East and Asia, which could be reflective

of underlying cultural norms which constrain the activity of females in driving, creating a highly selective female driver population or unique patterns of anger expression due to cultural scripts [18, 19]. A good example is in Pakistan. Driving is still largely an activity of men; women face significant social, structural, and safety obstacles to driving, particularly in the non-metropolitan areas [20]. The evaluation of gender variation in driving anger among a Pakistani sample is therefore relevant at both theoretical terms and practicality of adopting road safety interventions in this scenario.

On top of the gender, dozens of demographic and contextual factors have been taken into account as the correlates of driving anger. The age is of special concern, as the risk-taking and sensation-seeking behaviors are widely known to decrease with age. The youthful drivers, the drivers under the age of 25, are always the most vulnerable group in aggressive driving, accidents, and anger in driving [2, 21]. Developmentally, the prefrontal cortex might be relatively immature in adolescents and young adults, which can lead to emotional regulation, impulse regulation and perspective-taking being impaired [22]. However, with age more effective coping strategies and emotional control proficiencies can arise and this aspect will lead to an inverse relationship between age and driving anger.

Another related individual difference is the education level. An increase in the level of education has been associated with enhanced emotional intelligence, cognitive flexibility, and increased exposure to information about the dangers of aggressive driving [23]. Theoretically, better educated people may be in a better position to reevaluate anger provoking driving conditions using non-hostile language, thereby, lowering the chances of anger outburst. There have been contradictory empirical results on the relationships between education and driving anger; some studies have found that education is inversely related to anger [24], whereas studies have found no significant relationship between education and anger driving.

The amount of hours each day of driving experience has received relative fewer empirical studies, yet it is theoretically significant. Drivers who are more exposed to road conditions over time have a higher chance of having experienced an anger provoking event and thus can confirm a hypothesis of cumulative provocation which predicts a positive relationship or correlation between driver hours and anger rating. This impact can be especially strong in difficult traffic conditions, such as in Pakistani cities, because of the state of roads, traffic congestion, and the conduct of drivers, the context of high-stress situations is always present [20, 24].

The type of vehicle is a factor that should be explored in the Pakistani setting. Car drivers and motorbike riders hold different positions in the ecology of the traffic in the country. Motorbike riders are more exposed to the hectic flow of traffic, they are in

a relatively weak physical position, and they are often victims of aggressive actions of bigger cars. Such circumstances can cause special anger experiences unlike that experienced by car drivers whose closed space that a car provides can dissipate interpersonal provocations to produce driving anger.

Although the applicability of driving anger to the road safety issue is apparent in Pakistan, there is a dearth of empirical research on the subject. An extensive investigation into predictors of driving anger in a Pakistani sample has not been reported on gender, age, education, driving exposure and type of vehicle. This is the gap in the empirical literature that the present study was aimed at filling.

The study objectives were as follows: (a) gender differences in driving anger; (b) association of driving anger with continuous demographic variables such as age, education, and daily hours of driving; (c) driving anger by groups of vehicles; and (d) independent predictors of driving anger using multiple regression analysis.

The directional hypotheses presented below were based on the theoretical frameworks and of the empirical literature reviewed above:

H1: Men will report significantly higher driving anger scores than women.

H2: Age will be negatively and significantly associated with driving anger.

H3: Education will be negatively and significantly associated with driving anger.

H4: Daily hours of driving will be positively and significantly associated with driving anger.

H5: Gender, age, education, vehicle type, and daily driving hours will together significantly predict driving anger, with gender, age, and daily driving hours emerging as the strongest individual predictors.

## Method

### Participants

500 Pakistani drivers (n = 293 men, 58.6%; n = 207 women, 41.4%) participated in the current study. The participants were aged between 18 and 60 years (M = 38.60, SD = 12.48). Formal education years ranged between 8 and 20 (M = 17.23, SD = 2.84), thus, representing a graduate and postgraduate sample, mostly. On the question of vehicle, 329 participants (65.8 %) indicated that they use motorbikes as their main vehicle, and 171 (34.2 %) reported consuming a car. The numbers of the driving hours were between 1 and 10 daily (M = 4.58, SD = 1.87). All the respondents were active drivers during the study and had a valid Pakistani driving license.

### Measure

Driving Anger Scale -Short Form - DAS-14 [4] consists of 14 self-report questions, aimed at measuring the severity of anger when in everyday driving (e.g. being overtaken, facing a sluggish motorist, witnessing a dangerous driver). All items are rated using a five-point Likert scale (1= not at all angry to 5= very angry). Scores can range between 14 and 70 with high scores implying a high degree of driving anger. The DAS-14 has been proven to be reliable ( $\alpha = 0.80-0.90$ ) and viable among various international samples [11-13].

### Procedure

Participants were engaged using a convenient sampling approach. Data were gathered in person in various locations within Rawalpindi and Islamabad, Pakistan, such as university campuses, parking lots, gas stations, as well as commercial transport hubs, thus making it possible to approach a diverse range of drivers who have diverse occupational and demographic backgrounds. Potential participants were told about the objective of the study. Their consent to participate in the study was duly obtained. Individuals who agreed to take part filled in a structured questionnaire with demographic questions and the DAS-14. The participation was voluntary, anonymous, and unpaid. The research followed the ethical standards in the Declaration of Helinski. The questionnaire took around 10 minutes to answer.

### Data Analytic Strategy

All the analyses were performed using Statistical Package of Social Sciences (SPSS, version 23). None of the cases had missing data. Cronbach's alpha ( $\alpha$ ) was used to measure the internal consistency of the DAS -14. All the study variables have been calculated using descriptive statistics such as means, standard deviations, minimum, maximum values, skewness, and kurtosis. The Shapiro wilk test was used to test the normality of the DAS -14 total score distribution. Though the test has turned out to be statistically significant, a common occurrence at large samples, the skewness and kurtosis values showed that there were insignificant errors in non-normality and thus, parametric tests were justified. T-test effect sizes were calculated in Cohen d terms with 0.20, 0.50 and 0.80 cut-offs to represent small, medium and large effects, respectively [25]. The Pearson and Spearman correlation was done between driving anger and continuous predictors. There was a simultaneous multiple linear regression that used gender, age, education, type of vehicle and hours of driving daily as predictors.

## Results

### Descriptive Statistics and Reliability

Table 1 indicates descriptive statistics of each of the variables. The DAS-14 mean score was 41.83 (SD=13.34) and this had a range

of 14 to 70. Skewness (0.04) and kurtosis (-0.69) were within reasonable ranges, which is an approximately symmetric distribution. The Shapiro-Wilk test was found to be significant ( $W = 0.99, p = .001$ ); the insignificant skewness and kurtosis values indicated that this significance was due to the sensitivity of the test to large samples and not due to significant non-normality. The DAS-14 alpha (.97) was very high and this implies excellent internal consistency [26].

Variable	M	SD	Min	Max	Skewness	Kurtosis
Gender (1=M, 2=F)	1.41	0.49	1	2	0.35	-1.89
Age (years)	38.60	12.48	18	60	-0.03	-1.24
Education (years)	17.23	2.84	8	20	-0.75	-0.43
Vehicle (1=Bike, 2=Car)	1.34	0.47	1	2	0.67	-1.56
Hours of Driving/Day	4.58	1.87	1.0	10.0	0.15	-0.19
DAS-14 Total	41.83	13.34	14	70	0.04	-0.69

*Note.*  $N = 500$ . Gender: 1 = Male, 2 = Female. Vehicle: 1 = Motorbike, 2 = Car. DAS-14 = Driving Anger Scale Short Form (14 items; Deffenbacher, et al.). Cronbach's  $\alpha = .97$ .

**Table 1:** Descriptive Statistics for All Study Variables.

### Gender and Vehicle Type Differences in Driving Anger

Independent sample t-test was used to compare gender on the DAS-14 total scores. The males had a large effect size and therefore, the first hypothesis is correct since they reported a lot higher driving anger compared to the females ( $M 46.27, SD 12.12$  vs.  $M 35.53, SD 12.45$ ;  $t(498) 9.65, p.001, d.88$ ). A t -test of motorbike riders ( $M 41.26, SD 13.75$ ) compared to car drivers ( $M 42.92, SD 12.49$ ) showed no significant difference ( $t(498)1.33, p.185, d.13$ ), and there was no meaningful difference in driving anger depending on the vehicle type. The findings are summarized in Table 2.

Variable	Group	n	M	SD	t	df	p	d
Gender	Men	293	46.27	12.12	9.65	498	< .001	0.88
	Women	207	35.53	12.45				
Vehicle Type	Motorbike	329	41.26	13.75	-1.33	498	.185	-0.13
	Car	171	42.92	12.49				

*Note.*  $d =$  Cohen's  $d$  effect size. Large effect:  $d \geq .80$

**Table 2:** Group Comparisons of Driving Anger by Gender and Vehicle Type

### Correlations Between Driving Anger and Continuous Variables

**Table 3** presents Pearson and Spearman correlations between the total score of the DAS-14 and age, education and hours of driving per day. Driving anger was found to have a significant negative correlation with age ( $r -.36, p<0.001$ ;  $r_s-0.36, p <0.001$ ), which confirmed the second hypothesis. Education, also, was significantly negatively correlated with driving anger ( $r = -.33, p <0.001$ ;  $r_s= -.33, p <0.001$ ), which confirms the third hypothesis. Driving anger exhibited a positive relation with the number of hours spent on driving a day ( $r = .41, p<0.001$ ;  $r_s= .40, p<0.001$ ), which supports the fourth hypothesis. Correlations were observed to be equal between parametric and non-parametric indices, which showed strong results.

Variable	Pearson r	P	Spearman $r_s$	p
Age (years)	-.36	< .001	-.36	< .001
Education (years)	-.33	< .001	-.33	< .001
Hours of Driving/Day	.41	< .001	.40	< .001

*Note.*  $N = 500$ . All correlations statistically significant at  $p < .001$ .

**Table 3:** Pearson and Spearman Correlations Between Driving Anger and Continuous Demographic Variables.

### Multiple Linear Regression

An independent multiple linear regression determined the independent predictors of driving anger (hypothesis five). The general model was statistically significant,  $F(5, 494) = 73.52, p = .001, R^2 = .427, \text{adjusted } R^2 = .421$ , which means that a combination of five predictors explained 42.7% of the variance of DAS-14 total scores. Gender ( $B = 9.61, SE = 0.93, t = 10.36, p < .001$ ), age ( $B = 0.26, SE = 0.06, t = 4.15, p = .001$ ), and the number of hours driven per day ( $B = 2.75, SE = 0.24, t = 11.26, p = .001$ ) were identified as significant independent predictors. Education had no significant value ( $B = -1.03, SE = 0.96, t = -1.07, p = .285$ ), whereas vehicle type was not significant ( $B = -1.03, SE = 0.96, t = -1.07, p = .285$ ). Table 4 shows the full regression coefficients.

Predictor	B	SE	t	p	95% CI
Constant	60.93	3.89	15.68	< .001	53.30, 68.57
Gender	-9.61	0.93	-10.36	< .001	-11.43, -7.79
Age	-0.26	0.06	-4.15	< .001	-0.39, -0.14
Education	-0.54	0.28	-1.94	.053	-1.09, 0.01
Vehicle Type	1.03	0.96	1.07	.285	-0.86, 2.92
Hours of Driving/Day	2.75	0.24	11.26	< .001	2.27, 3.23

*Note.  $R^2 = .427, \text{Adjusted } R^2 = .421, F(5, 494) = 73.52, p < .001$ . Gender coded as 1 = Male, 2 = Female; thus negative B indicates men score higher. Vehicle Type: 1 = Motorbike, 2 = Car.*

**Table 4:** Multiple Linear Regression Predicting DAS-14 Total Scores.

### Discussion

The current study studied driving anger among a sample of 500 Pakistani drivers with the DAS-14 with a concentration on gender differences, demographic correlates, and predictive capacities of demographic factors. The results were largely consistent with the hypotheses: men were found to be much angrier when driving, compared to women; there had been an inverse relationship between age and education with driving anger; and positive relationship between driving hours in a day and driving anger. During the multivariate analyses, gender, age, and the amount of time spent driving on a daily basis proved to be the strongest independent predictors, with their combination (over 42 percent) explaining the driving anger scores. The internal consistency of the DAS-14 was excellent ( $\alpha = .97$ ), which means that it can be used with Pakistani samples.

#### Gender Differences in Driving Anger

The most conspicuous result of the current research was the significant and statistically significant difference in driving anger between the genders, and therefore, men achieved a score of about 10.7 higher than women in the DAS-14 ( $d = .88$ ). This effect size is large by traditional standards [25] and agrees with most of the Western literature that indicates a high level of driving anger with male drivers [4, 14]. This result is a strong support of H1 and cross-cultural validation to an emerging and solid finding in a variety of national contexts.

The given gender difference can be explained by a number of theoretical frameworks. The social learning theory [16] states that gender variations in aggression, which also encompass driving aggression, are caused by varied socialization trends. Boys are generally conditioned to externalize their anger and to react to provocation with dominance assertive behavior, whereas girls are socialized to control anger using internal control and prosocial coping. The socialization processes in this way are exaggerated in a patriarchal cultural environment like Pakistan, where masculine principles of honor, power and status-assertion are especially relevant. To Pakistani men, a road can serve as a social space where the social status is claimed and challenged and thus perceived insults and provocations are highly likely to provoke anger.

The self-regulation literature is another point of view. The studies are always keen to conclude that women are stronger than men in terms of emotional self-control and inhibition especially when it comes to provocative or stressful interpersonal settings [27]. This can be reflected in the driving context, by being able to re-evaluate the frustrating situations such as the other driver making a dangerous move, which can be attributed to haste or lack of experience and not hostility thus eliminating the possibility of rage building up. These differences in self-regulation might also be affected by the fact that men are more susceptible to the hostile attribution bias [10] and this might explain their steady high scores in driving anger.

Structural factors are also worth taking into consideration. In Pakistan, men travel much more, have a wider range of driving situations, and are more prone to the competitive and high-density traffic environments, which happen to be least predictable and the most likely to trigger anger. The gender difference could be partly explained by longer driving exposure as the present study has confirmed that hours of driving are positively correlated with anger. But since the concept of gender remained a strong predictor in the multivariate regression once the driving hours were taken into account, gender difference cannot solely be explained by the fact that people are exposed to it in diverse ways.

### **The Role of Age**

In the correlational and regression analyses, age was found to be a major negative predictor of driving anger ( $r = -.36$ ;  $B = -0.26$ ,  $p < .001$ ), which supports H2, and the overall developmental body of literature on anger and aggression. The results that the older drivers show less driving anger are conceptually sound in various aspects. The studies on development have always observed the decreasing trend of reactive aggression, sensation seeking, and impulsivity throughout the adult lifespan [22, 28]. Regarding the selectivity theory of socio-emotions [29], older people focus more on emotion regulation and positive affect and are more likely to withdraw responses to anger arousing situations instead of increasing the conflict. This can be expressed in the context of driving, whereby it can be increased tolerance to obstructive or inconsiderate driving behavior, less hostile attribution, and better utilization of calming self-talks.

Practically speaking, the correlation between driving anger and age has its implications on road safety programming. Not only are the younger drivers more anger-prone, but also more inclined to demonstrate the same anger by exhibiting behavioral aggression; tailgating, speeding, and aggressive overtaking [30]. The interventions aimed at anger management and cognitive reappraisal skills might be especially useful in the case of young male drivers whose intersection of two strongest risk factors identified in the current study. Such targeted interventions have the potential to influence public health in a meaningful way in Pakistan where young men are the majority in road traffic carnage [1].

### **Education and Driving Anger**

The bivariate correlation between education and anger when driving was significant and negative ( $r = -.33$ ,  $p < .001$ ), which was in line with H3. Nevertheless, education was almost missed in the multivariate regression ( $p = .053$ ) and indicating that its correlation with driving anger might be partially mediated or confounded by other factors in the model (especially age whereby more educated participants in this sample were older). However, the trend in

results is generally in line with the hypothesis according to which high educational levels are related to low driving anger.

The correlation between education and driving anger is inversely related, which should be the case due to a number of reasons. Education is linked with higher cognitive complexity, perspective-taking ability, and emotional literacy, all of which can lead to a decreased probability of hostile attribution of specific driving situations and the development of anger [23]. Educated persons can also access more information regarding the psychological and safety implications of aggressive driving and be more inclined to have social norms against aggressive behavior internalized. Moreover, higher education is linked to more socioeconomic status in Pakistani context and, possibly, more modern, comfortable, and more insulated automobiles, which could decrease the exposure to the most directly provocative aspects of traffic interaction.

The fact that the education effect in the multivariate model is attenuated is an indication that researchers ought to be wary of interpreting bivariate correlations of education and driving anger without effectively controlling other correlated demographic variables. Future studies ought to investigate possible mediators of such relations such as emotional intelligence, driving self-efficacy and stress coping styles.

### **Daily Driving Hours as a Predictor**

The regression model (H4), and the cumulative provocation hypothesis, were supported by the fact that maximum number of driving hours per day was the strongest predictor of driving anger ( $B = 2.75$ ,  $t = 11.26$ ,  $p < .001$ ). Varying scores of one hour of increased daily driving were on average 2.75 points higher using DAS-14 scores after adjusting for the effects of other predictors. It is a huge and practically important impact that emphasizes the price of long distances driving on the emotional health of Pakistani drivers.

The significant correlation between driving exposures and anger is not new as the previous studies established that professional drivers, long-distance commuters and individuals who spend a lot of time in traffic express a greater amount of stress, anger and burnout [24]. In a sense of resource depletion, prolonged driving requires maintenance of attentional and emotional resources; since these resources become exhaustible throughout a driving session, anger threshold may be lowered gradually, and drivers become increasingly responsive to provocation, which they would otherwise have ignored earlier in a drive [31]. Urban traffic conditions in Pakistan can be considered to be one of the most messy in the world, the mixed-mode traffic is dense, chronic congestion, heat, and noise pollution are present, and thus the psychological burden of the long daily commuting will be especially high.

This policy has direct implications for these findings. Evidence of the relationship between driving hours and anger and, consequently, road aggression and accidents could inform regulations on the maximum working hours of professional drivers, including truck drivers, taxi operators, and ride-hailing drivers. Equally, the urban planning plans that can help lessen the commute time and relieve traffic jams may trickle down to the wellbeing of drivers and road safety.

### **Vehicle Type**

To the contrary, vehicle type was not a significant predictor of driving anger in the t-test and the regression analysis. Driving anger accelerated by motorbike riders and car drivers were found to be statistically the same, both at the bivariate level and after adjusting other predictors. This null result is slightly unexpected considering the theoretical rationale according to which bikers riders can be angrier by their sheer vulnerability and exposure to traffic and the fact that they are more vulnerable. The first reason is that motorbike riders in Pakistan have become more accustomed to the chaotic road conditions than car drivers: they have trained to drive through a new repertoire of behavioral tactics, namely; lane-splitting, filtering, and avoidance, which do not rely on confrontation in such an environment. Drivers on the other hand can be angry in other ways, frustration with unmovable traffic congestion, or the behavior of motorbike riders passing through the traffic. Such anger-related paradoxical incidents can eventually result in the same amount of general driving anger even though they vary in the qualitative nature.

### **Limitations and Future Directions**

The current research has a number of limitations that should be mentioned. To start with, convenience sampling does not allow generalization of the results to the rest of the Pakistani driving population. The sample was also largely metropolitan and high-education (M=17.23years) and this aspect does not reflect the rural drivers or less educated attainment. In future studies, there should be an attempt to have nationally representative samples, either done by stratified or cluster sampling.

Second, the current study is cross-sectional, which does not allow making any causal assumptions. The high correlations between driving hours and driving anger, such as, also admit of the interpretation that angry people drive more (perhaps because they are less apt to use alternative transport or give driving up to others) as well as the interpretation that driving anger is caused by extended driving. These would be stronger evidence of causal mechanisms and would be better supported by longitudinal designs, such as driving simulators, paradigms, or ecological momentary assessment studies.

Finally, the current study did not measure potentially valuable

psychological covariates of driving anger, such as trait anger, general aggressiveness, driving self-efficacy, hostile attribution tendencies, and stress coping styles. The incorporation of this type of variables in the future would enable a more detailed explanation of the variation in anger motivation and would enable the mediation studies that would provide a clear understanding of the mechanisms by which demographic variables have their influence.

### **Practical Implications**

The results of the current study can be applied in road safety in Pakistan in a number of ways. The fact that the young male drivers who take many hours on the road are the most at risk group of driving anger presents a clear target population that can be targeted by the intervention. Driving-specific anger management programs, which include cognitive restructuring, relaxation, and training driven-specific coping skills, have been shown to be effective in driving anger reduction in western-based studies and could be piloted to Pakistan. This may be done by providing such programs in the form of driver education which is required at the stage of license issuance, or occupational health programs focused on professional drivers in the workplace.

At the policy level, the ambient provocativeness of the Pakistani roads can be reduced by investing in the improvement of road infrastructure (e.g., enhancing the demarcation of lanes, managing of signals, and enforcement of traffic regulations), and, consequently, the number and severity of anger-inducing encounters can be mitigated. These structural interventions could be supported by public awareness campaigns on the risks of driving under the influence of anger and fostering a culture of patience and mutual respect on the road. Lastly, the current evidence highlights the importance of considering any psychological measures of driving anger when renewing a license or conducting a post-accident evaluation, as a way of determining the high-risk motorists who could be assisted psychologically in a specific manner.

### **Conclusion**

The current study provides empirical data to show that driving-related anger is a psychologically significant and demographically patterned behavior of drivers in Pakistan. Male drivers, people of younger age cohort, people with less educational level, and people receiving higher exposure to driving daily are all overly vulnerable of high rates of driving-related anger. The multivariate regression explained over 42% of the driving-anger variance, gender, age and daily driving hours were the strongest predictors of independent variables. These findings contribute positively to cross-cultural research on driving-induced anger, as well as, provide empirical basis on which evidence-based road-safety intervention can be developed in an attempt to specifically address high-risk drivers in the Pakistani context. Future research must advance the findings through a longitudinal study, increase sampling scope, and use

extensive psychological testing to understand driving-related anger in this gap area but a highly essential environment.

### Acknowledgments

The authors are grateful to all participants who generously gave their time to take part in this study.

### Ethical Considerations

Participation in the study was voluntary, anonymous, and no financial incentives were provided to the participants. The research was conducted in accordance with the ethical principles outlined in the Declaration of Helsinki. Participants were informed about the purpose of the study and their right to withdraw at any time without any consequences. Completion of the questionnaire required approximately 10 minutes.

### Conflict of Interest

The authors declare that there are no conflicts of interest regarding the publication of this paper.

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