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A Study of The Psychological Factors that Influence the Dangerous Driving Behaviour of Drivers

Dr Mohammed Najeeb. P. M, Ph.D.

Deputy Transport Commissioner, Motor Vehicle Department, Ministry of Transport, Kerala, India.

Mob +91 8589067717,

najeeb.blossom@gmail.com

Abstract

An analysis of traffic accidents indicates that human factors are a sole or a contributory factor in approximately 90% of road traffic accidents. The present study examined the extent to which Type A behaviour pattern, Sensation Seeking behaviour, Propensity to Aggression, Hostility, Attitude to Speeding and demographic variables including Age, Experience and Education have an effect on Dangerous Driving Behaviour of drivers. The Data was obtained from 500 drivers on standardized instruments such as Dula Dangerous Driving Index, Hostility scale (MMPI), Propensity to Aggression Scale, Sensation Seeking Scale (Zukerman) Type A behaviour Scale and Attitude to Speeding Scale. The Result presented in this study revealed that there was an effect of age, experience and education and significant influence of personality traits and attitude on Dangerous Driving Behaviour of drivers.

Key Words: Dangerous Driving Behaviour, Type A behavior, Sensation Seeking, propensity to aggression, Hostility and attitude

1. Introduction:

The National Crime Record Bureau Reported that, in India the number of road accidents, deaths due to road accidents and injuries due to road accidents are very high and increasing every year. During the year 2016; 4, 80,652 road accidents caused death of 1, 50,785 persons and injured 4, 94,624 human beings. It is estimated that the country loses around 750 billion Rupees (\$17 billion) per year due to road traffic accidents, which is 2-3 per cent of the gross domestic product (Sikdar & Bhavsar, 2009). Dangerous Driving Behaviour is an important factor behind traffic accidents and many lives could be saved if all drivers complied with the rules. This project is aimed at exploring the extent to which the psychological factors affect Dangerous Driving Behaviour among the drivers. Without increased efforts and new initiatives, the total number of road traffic deaths worldwide and injuries is forecast to rise by 65% between 2000 and 2020, and in low income and middle-income countries deaths are expected to increase by as much as 80% (Peden *et al.*, 2004). Consequently, the fatality rate per 10,000 vehicles in India is 15-20 times higher than that in developed countries. India has just 1% of the world's vehicles, but accounts for nearly 12% of the road traffic fatalities, while Highly Motorized Countries (HMC) having 60% of the world's motor vehicles account for only 14% of the total road fatalities.

Driver behavior is the basis for ensuring the safe and efficient flow of traffic on motor ways around the world. Unfortunately, driver behavior is one of the primary causal factors for accidents, traffic snarls and injuries. Driving a vehicle may be described as a dynamic control task in which the driver has to select relevant information from a vast array of (mainly) visual inputs to make decision and execute appropriate control responses in order to achieve mobility with safety (Fuller, 2002). However, the driver is not always able to operate at their level of competence due to the limitations of the human factor.

Whilst understanding the causes of dangerous driving behaviors (e.g., speed, reckless riding behavior, violation issues) assists in the development of initiatives aimed at reducing crashes, the theoretical formulation in this context can play a pivotal role in not only explaining, but also predicting, and ultimately changing the behavior that leads to crashes. Theory can provide a basis for understanding

the underlying psychosocial mechanisms inherent in risk-taking behavior and, most importantly, the means for changing them. Theory enables to apply the appropriate strategies at targeted group, which have predictable (theorized) outcomes. If the theory is sound, interventions can be developed with the knowledge that they are reasonably likely to result in behavioral changes and, therefore, play a protective role in preventing such crashes from ever occurring. For this reason, a strong theoretical framework has guided this research.

Analysis of traffic accidents indicated that human factors are a sole or a contributory factor in approximately 90% of road traffic accidents (Lewin, 1982; Rumar, 1985). However, less progress has been made in understanding the behavior of the road users as compared to many improvements in road environment and vehicles (Rothengatter, 1997). As a result, psychological analysis has become important in ensuring traffic safety by focusing on emotional, attitudinal, and personality factors that influences driving behavior and causes accidents. Individual differences in accident liability reflect individual differences in cognitive performance, psychosocial factors such as attitudes, and personality (Beirness, 1993; Elander, West, and French 1993; Lester, 1991). As human behavior is assumed to be a major factor behind these accidents (Rumar, 1985) it is not surprising that research in psychology showed an early interest in traffic and traffic safety.

1.1. Dangerous Driving

Dangerous driving can be defined as deliberate deviations from safe driving (Malta, 2004). It includes a wide range of on-road violations, such as running red lights, speeding, dangerous overtaking, tailgating etc. As all these behaviors are linked with accident involvement, they deserve attention from a traffic safety perspective (Blows *et al.*, 2005). Dangerous driving is associated with demographic variables such as gender, age and driving exposure. Younger males tend to drive more dangerously in comparison with older drivers and females (Asbridge *et al.*, 2003; Blows *et al.*, 2005). In addition, frequent exposure to driving, in terms of kilometers driven per year, is linked with more frequent manifestations of dangerous on-road behaviors (Harding *et al.*, 1998; Wells-Parker *et al.*, 2002). Dula and Geller (2004) highlighted problems of dangerous driving which encompasses aggression with intent to harm, negative emotions and cognitions such as anger, frustration, and rumination, as well as risky driving behaviors which are often considered as aggressive, but which lack actual intent to harm.

1.2. Personality and Dangerous Behavior

A widespread belief that road accidents are rather due to personality factors than mechanical faults of the vehicles is embodied in the saying that “the nut behind the wheel is the real problem on the road” (Nader, 1965). Following his investigations into roadworthiness of a number of makes of vehicles, Nader (1965) felt that the human contribution to accidents greatly exceeds those of roads or vehicles. Sanchez-Jiminez, (1967) claimed that 90% of road accidents were due to the personalities of the drivers concerned, while Selez and his colleagues estimated that 80-90 percent of road deaths in the United States of America were due to driver errors. Most investigators would agree that personality factors contribute to the prime cause of road accidents (Don, 2005).

A range of personality factors are also related to risky driving and crash involvement. The most prominent ones are mild social deviance, hostility, sensation seeking (Zuckerman, 1979), aggression, impulsiveness, emotional liability, locus of control, and antisocial motivation (Hilakivi *et al.*, 1989; Arthur, Barrett&Alexander,1991; Beirness, 1993; Elander, West & French, 1993; Lawton *et al.*, 1997; West & Hall, 1997; Underwood *et al.*, 1999). Gulliver and Begg (2007) reported that personality characteristics are found to be associated with persistent risky driving behaviors, and their potential outcomes, in young adult males. If personality traits can be identified at a young age, perhaps they could be targeted before these individuals start driving, to try and prevent them from developing such behaviors. A study

conducted by Yagil (2001) is worth mentioning in this context. Yagil (2001) studied the impact of personality traits on young male drivers' attitudes and their intention to commit driving violations. Applying path analysis, Yagil (2001) found that sensation-seeking, locus of control and aggressions are more likely to affect drivers' attitudes towards violations, which in turn influence intentions to commit violations.

Sensation seeking is "a trait defined as seeking varied, novel, complex, and intense sensations and experiences, and the willingness to take physical, social, legal, and financial risks for the sake of such experience" (Zuckerman, 1994, p. 27). Sensation seeking traits can be measured using a standard self-report questionnaire (e.g., SSS-V). These traits can be classified into four dimensions such as thrill and adventure seeking, experience seeking, disinhibition and boredom susceptibility (Zuckerman *et al.*, 1978).

The Studies of Hatfield and Job (2006) and Trantera and Warnb (2008) indicated a significant relationship between attitudes to speeding and speeding violations. Dahlen and Ragan (2004) and Leal, Nerida and Pachana, Nancy (2009) indicates an increase in violation behaviour with propensity to aggression. Rebecca Lancaster and Rachel Ward (2002) found that, aggressive drivers, or those with a reduced capacity to manage or control hostility, tended to be involved in more traffic accidents. Sensation-seeking is consistently linked to risky driving behaviour in empirical research (Jonah, 1997). Schwebel et al, (2006) reported sensation seeking also emerged in a multivariate analysis predicting one measure of self-reported driving violations. Richard Tay, Philip Champness and Barry Watson (2003) examined the influence of sensation seeking and Type-A behaviour pattern on speeding behaviour and reported that self-reported speeding behaviours were positively correlated with both personality traits. Drivers with type A behaviour pattern typically have strong need to get from point A to point B quickly and to get ahead of others in the traffic flow (West et al, 1993). Locus of control (LOC) is one of the most crucial psychological factors determining a driver's behavioural adaptation. Holland, Geraghty and Shah (2010) found that externally oriented persons are more likely to be involved in car accidents, as they would take fewer precautions to prevent road accidents.

1.3. Age, Experience and Education

Willemsen et. al. (2008) reported that older drivers and female drivers tend to have low levels of DDDI dimension which is consistent with international literature, suggesting that drivers seem to become more law abiding and display a tendency to take lesser risks when they grow older. The risk of involvement in crash seems to depend upon the drivers' age. The young (18 to 25) and the elderly are (65+) at risk. However, with regards to accident causation, it seems that young drivers are more likely to commit violations, and the elderly to be more prone to slips and lapses (Parker et.al, 1992). Machin and Sankey (2008) have shown that inexperienced drivers underestimate the risks associated with a range of driving situations. The majority of aggressive drivers were poorly educated (Rebecca Lancaster and Rachel Ward, 2002).

Reviews of literature shows factors determining this kind of behaviour include attitudes, personality and demographical variables like age, experience, and education. The aim of this study was to investigate the psychological factors and demographic variables of drivers influencing traffic rule violations. Traffic violations have been described as a common form of law breaking found to predict road accidents.

2.Methods

The descriptive survey research design was followed to examine the dangerous driving behavior of drivers and its relationship with various personality traits, attitudes to speeding and demographic variables such as age, experience and education. Comprehensive standardized questionnaires measuring the various dimensions were administered to the targeted respondents to elicit

the required data. A set of key psychological variables viz, hostility, propensity to aggression, sensation seeking, Type A behaviour pattern, locus of control and attitude to speeding were tested as predictors of dangerous driving behavior of motor vehicle drivers. Further, the three personal factors-such as age, experience and education level- were also tested for their influence on driving behaviour.

A sample of 500 drivers was selected from list of drivers of 10 Licensing Authorities of the state randomly, and requests were sent to them requesting them to participate in this highly relevant research. Sample selected are male drivers of various vehicles, aged above 18 years to 46 and above, education from 7th standard to graduate level. Sample having experience of 1 to 20 years and above has been selected. A facing sheet with instructions filled in by all participants reveals their range of age, experience in driving and education level. dangerous driving behavior was assessed with the scale adapted from Dula Dangerous Driving Index (1999). Personality was assessed with questionnaires on locus of control (Rotter, 1966), sensation seeking scale (Zuckerman-Kuhlman personality questionnaire; Zukerman et al, 1993), Type-A behavior by "Bortner's Short Rating Scale of Pattern A Behaviour", Hostility scale adapted from Minnesota Multiphasic Personality Inventory, and Propensity to Aggression scale from Watson (2007) adapted from the driver behaviour questionnaire (Reason et al., 1990). Attitude to speeding was assessed using the scale adapted from standardized speeding behaviour scale of Patrick De Pelsmacker and Wim Janssens (2006). The statistical techniques used for the analysis of the data for the present study are one-way ANOVA; post Hoc (Duncan test), Pearson Correlations, and Multiple linear Regression.

3.Problem

In this study, the investigator attempts to explore the effect of various psychological and demographic factors on Dangerous Driving Behavior (DDB). The aim of this study was to verify the effect of demographic variables such as age, experience and education and the relationship and the influence of psychological variables including, sensation seeking, type A behaviour pattern, hostility, external locus of control, propensity to aggression and attitude towards speeding on the Dangerous Driving Behavior (DDB).

4.Results and Discussion

This study revealed that younger groups showed maximum dangerous driving behavior that gradually decreases with age. Scores of the respondents on dangerous driving behavior showed that only 2.2% scored low (below 25%) in DDDI, 73% responded moderate (25 to 50%) and 27% high (50 to 75%) and no one had very high scores (above 75 %). The scores in DDDI highlight the drivers' high inclination to dangerous driving. Effect of demographic variables, relationship and influence of psychological variables are analyses in following sections.

4.1. Effect of Demographic Variables

4.1.1.Age and Dangerous Driving.

The result of ANOVA showed that there were significant difference among the four age groups in dangerous driving behavior ($F_{(3,496)} = 8.01; p < 0.01$). The post hoc test showed the 18-25 age group ($M = 63.74, SD = 14.84$) have significant differences in Dangerous Driving with 26-35 years age group ($M = 58.07, SD = 12.00$), 36-45 years age group ($M = 57.43, SD = 12.41$) group and 46 years and above group ($M = 57.28, SD = 14.86$). Further the Means for different age groups suggest that the youngest group indicated a high level of dangerous driving behavior and the tendency to display this behavior reduced with increasing age. This finding suggests that the dangerous driving behavior of younger drivers was higher and reduced with age significantly.

Compared to other age groups, younger groups were found to be more likely to underestimate the probability of the specific risks caused by traffic situations (Brown & Groeger, 1988; Deery, 1999)

and to have a propensity to perceive themselves as invulnerable to negative outcomes (Millstein,1993). Dula and others (2003) reported that older drivers and female drivers tend to have low levels of DDDI scores which is consistent with international literature, suggesting that drivers seem to become more law abiding and less likely to indulge in risk taking when they grow older (Golias & Karlaftis, 2002).

4.1.2. Experience and dangerous driving.

The results of ANOVA indicated that there were significant differences in dangerous driving behavior among groups of drivers with differences in experience ($F_{(3,496)} = 4.07, p < .01$). The post hoc test indicated that the dangerous driving behavior scores of the group with 5-10 years' experience, the group with above 20 years of experience and the group with 10-20 years of experience were not significantly different. In subset 2, which included groups 1-5 years of experience, 5-10 years' experience and above 20 years' experience were found not to differ significantly. Drivers who had 1 to 5 years of experience significantly differed in dangerous driving behavior with those drivers who had 10 to 20 years of experience.

Machin and Sankey (2008) has shown that inexperienced drivers underestimate the risks associated with a range of driving situations. Yilmaz and Celik (2006) found that drivers having less than two years' experience demonstrated a positive attitude towards obedience to speed rules relative to those with over two years of experience. Vassallo *et al.*, (2010) indicated that most crashes had occurred when the cohort were less experienced drivers. These findings are in line with past research, which has linked driver inexperience to heightened rates of crash involvement (Cavallo & Triggs, 1996).

4.1.3. Education and dangerous driving behaviour.

The results of one-way ANOVA conducted for Dangerous driving on groups with different years of Education. The result indicated that there were no significant differences in Dangerous Driving Behavior among groups of drivers with differences in the years of Education received ($F_{(2,497)} = 2.91, p > .05$).

Macmillan (1975) also reported a failure to observe a significant relationship between education and accidents. Conversely, Dobson *et al.*, (1999) observed that those women with tertiary education, in the mid age group (45-50 years), displayed a significantly higher accident risk, but education did not have an effect in the younger drivers' group (18-23 years). The result indicated that there was no significant difference for Dangerous Driving Behavior among drivers with differences in their level of education.

4.2. Relationship of psychological variables with dangerous driving behavior

The results revealed that all the variables studied established a significant relationship with dangerous driving behaviour. Upon examining the relations of dangerous driving behaviour with psychological variables studied, it was found that Propensity to aggression ($r=.591, p<.01$) showed high positive correlation with dangerous driving behaviour. Sensation seeking behaviour ($r=.477, p<.01$) and Type A behaviour pattern ($r =.348, p<.01$) showed moderate positive correlation with dangerous driving behaviour. Attitude towards speeding had a significant positive correlation ($r =.320, p < .01$) with Dangerous driving behaviour. Dangerous driving behaviour significantly and positively correlated with Hostility ($r=.298, p<.01$) also. There is significant negative correlation for External locus of control ($r = -.192, p<.01$) with dangerous driving, which suggests that, the higher the External locus of control, the lower is the propensity to indulge in dangerous driving.

4.3. Influence of Psychological Variables on Dangerous Driving Behavior

Multiple regression analysis (block wise) using Dangerous driving behavior as the criterion variable and various psychological variables having a significant correlation with the dependent

variables as predictors were employed to observe which variables better predicted Dangerous driving behavior.

The results of multiple regressions showed that external locus of control had no direct influence and the influence is through sensation seeking behavior, propensity to aggression and hostility. Therefore, it can be inferred that among six dimensions influencing Dangerous driving behavior, Propensity to aggression, Sensation seeking behavior, Hostility, Type A behavior pattern and Attitude towards speeding are better predictors of Dangerous driving behavior.

Overall, the final model of regression analysis demonstrated 42% of the variance in dangerous driving (Model 6: $F_{(6,493)} = 61.33, p < .01, Adj. R^2 = .420$). This variance can be accounted by Propensity to aggression ($\beta = .408, t = 9.729, p < .01$), Sensation seeking behavior ($\beta = .179, t = 4.344, p < .01$), Hostility ($\beta = 0.112, t = 3.055, p < .01$), Type A behavior pattern ($\beta = 0.108, t = 2.843, p < .01$) and Attitude towards speeding ($\beta = .089, t = 2.400, p < .05$).

4.3.1. Propensity to aggression: Findings of this study revealed that propensity to aggression as a strong predictor of dangerous driving behavior and concurred with the results of previous studies. Anger prone drivers have reported more near accidents, less concentration and reduced vehicular control while driving (Deffenbacher *et al.*, 2001, 2002). Deffenbacher, Lynch, and Richards (2003) found drivers displaying high trait anger driving in a more dangerous manner, maintaining shorter time headways and being faster than drivers with low trait anger in non-provoking traffic situations and were twice more likely to have collisions.

A recent study by Deffenbacher (2009) reported drivers with a high level of anger are more easily angered on the road, engage in more aggressive and risky behaviors, and are at risk for some accident and injury related outcomes. A driver's ability to control anger is crucial, along with his or her general ability to control emotions. Anger is an acute emotional reaction elicited in traffic by situations often perceived or misinterpreted by the driver as a response to deliberate provocations by other drivers (Björklund, 2007). The results of multiple regression analysis in the present study found that propensity to aggression significantly influencing dangerous driving behavior. Leal and Pachana (2009), and Dahlen & Ragan (2004) observed similar findings. Therefore, attempts to modify Dangerous driving behavior of drivers should necessarily address the propensity to become angry while driving.

4.3.2. Sensation seeking behavior: Multiple regression analysis revealed that sensation seeking behavior was significantly associated with and was able to predict dangerous driving behavior. Sensation seeking is defined as the desire for and engagement in varied, arousing, novel and complex sensations and experiences (Zuckerman, 1984, 1994). It has been linked to risky driving behavior in empirical research (Jonah, 1997). A typical characteristic of sensation seeking is the willingness to accept risks for the sake of arousing experiences, and as such, sensation seeking is closely linked to risky driving (Jonah, 1997; Jonah *et al.*, 2001). White and Dahlen (2001) found that sensation seeking added significantly for predicting risky and aggressive driving; independent of anger, while driving (Dahlen *et al.*, 2005). Jonah *et al.* (2001) reported links between self-reported sensation seeking and risky driving behaviors. The present study concurred with the results of previous studies and found sensation seeking to be able to significantly predict dangerous driving behavior.

4.3.3. Hostility: Results of multiple regression analysis showed that hostility was one of the significant predictors of dangerous driving behavior. Road hostility was found to be related to dangerous driving behavior (Hemenway & Solnick, 1993). Lancaster and Ward (2002) found aggressive drivers, or those with a reduced capacity to manage or control hostility tend to be involved in more traffic accidents. Anger and hostility are constructs measured both as stable emotional patterns and as transient dispositional states. Whether considered as states or traits, the tendency toward hostile, frustrated, and angry behavior is repeatedly linked to risky driving (Deffenbacher *et al.*, 2001, 2002; Iversen & Rundmo, 2002).

The results of the present study; hostility predicts dangerous driving behavior, are in line with previous studies.

4.3.4. Type A behavior pattern: Multiple regression analysis revealed the association of Type A behavior pattern with Dangerous driving behavior. Drivers with Type A personality were found to have higher rates of traffic violations, crashes, tend to take more risks, drive more erratically and reported higher incidents of aggressive driving and speeding. These drivers typically have a strong need to get from point A to point B quickly and tend to get ahead of others in the traffic flow (Price, 1983; Shahidi *et al.*, 1991; Perry, 1986; Evan *et al.*, 1987; West *et al.*, 1993; Perry *et al.*, 2000). The present study findings show a similar pattern in relation to previous studies where Type A behavior significantly predicted dangerous driving behavior.

4.3.5. Attitude towards speeding: Regression analysis indicated that attitude towards speeding significantly influences dangerous driving behavior. Iverson & Rundmo (2004) found that attitudes towards speeding were strongly related to high-risk behavior in traffic and involvement in near accidents and accidents. Warner and Aberg (2006) also identified a link between attitudes towards speeding and accident involvement. The results of the present study found low but significant associations for attitudes towards speeding and dangerous driving behavior.

The final model of regression analysis with dangerous driving behavior as the criterion variable and psychological variables as predictors accounted for 42 % of the total variance in Dangerous driving. This variance in Dangerous driving behavior was accounted by the influence of Propensity to aggression, Sensation seeking behavior, Hostility, Type A behavior pattern and Attitude towards speeding. Hence, these predictor variables are important while designing effective counter-measures for dangerous driving behavior.

5. Key Findings

The results showed that majority of the drivers in the population were maintaining high scores in dangerous driving. Result of this study showed that dangerous driving behavior is related and influenced by psychological variables studied. The demographical variables such as age, experience and education also showed significant effect on dangerous driving behavior and violation behavior of traffic rules.

Finding of this study suggests that the dangerous driving behavior of younger drivers was higher and reduced with age significantly. This study revealed that inexperienced drivers with 1 to 5 years' experience were higher on dangerous driving profile, and the group with 10 to 20 years of experience showed the lowest mean score.

Propensity to aggression and sensation seeking showed high positive correlation with dangerous driving behavior. Attitude to speeding, type A behavior pattern and hostility showed moderate positive correlation with dangerous driving behavior of drivers. External locus of control showed significant negative correlation with dangerous driving behavior.

Multiple regression analysis revealed that, among the psychological dimensions studied; propensity to aggression, sensation-seeking behavior, hostility, typeA behavior pattern and attitude towards speeding are better predictors of dangerous driving behavior. Apparently, propensity to aggression emerged as the strongest predictor of dangerous driving behavior followed by sensation seeking behavior, hostility, type A behavior pattern, and attitude towards speeding. Overall, the final model of regression analysis demonstrated 42 % of variance in dangerous driving.

6. Conclusions

This study revealed that the majority of the respondents reported comparatively high dangerous driving behavior. This investigation explored and established the effect of demographic variables, relationship and influence of psychological variables on dangerous driving behavior.

Dangerous driving varied with age and experience. Young, inexperienced drivers showed significant high dangerous driving behavior. The result showed that all psychological variables studied established significant relationship with dangerous driving behavior. Multiple Regression analysis for dangerous driving concluded that propensity to aggression was the strongest predictor of dangerous driving behavior followed by sensation seeking behavior, hostility, type A behavior pattern, and attitude towards speeding. Overall, the final model of regression analysis demonstrated 42 % of variance in dangerous driving.

The result of this study confidently concluded, that there were significant effects of age and experience on dangerous driving behavior. There were significant relationships of psychological variables with dangerous driving behavior. This study revealed predictive values of certain significant psychological variables for dangerous driving behavior. It revealed that dangerous driving behavior is related and influenced by the psychological variables studied. This knowledge has high relevance and implications in future road safety program and evolving driver behavior interventions in order to ensure sustainable road safety.

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