UNDERSTANDING ROAD RAGE: IMPLEMENTATION PLAN FOR PROMISING MITIGATION MEASURES

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Interview with the Expert

QUESTIONNAIRE ON ROAD RAGE

Q No. 1. Road Rage is a hot topic of discussion today due to a number of cases happening in Metropolitan cities. What is your opinion regarding Road Rage ?

Ans. Road Rage as a phenomenon indicates that the society is on an edge. That there are rankling issues which is causing this feeling of everybody being on an edge. It is a symptom of social fragmentation where one person is not able to appreciate and adjust with the problems of another.

Q No. 2. Is there any difference between Anger and Road Rage ?

Ans. Road Rage is momentary insanity arising out of irrational anger, which is due to the emotional load of frustration which an individual is carrying. The point at which Road Rage occurs is just a trigger, which brings forth the accumulated tensions, pressures and frustrations in the mind of an individual to the forefront. It is actually a cathartic reaction as I understand it.

Anger on the other hand may or may not be a result of bottling up of various frustrations. It could be because of any specific reason for example, a child wasting his time during examination, anger at unfair treatment, etc.

Q No. 3. Is there any relationship between Economic status and Perpetrators in Road Rage cases ?

Ans. Just as an observation, I would say that there is no relation between the two. Road Rage is largely dependent upon the personality of an individual and is not necessarily linked to his or her economic status.

Q No. 4. What is your message for mitigation of Road Rage ?

Ans. We all need to cultivate a sense of balance about everything. Frustration results when expectations are plugged too high. Expectations are high because one gets carried away by the image of "success in life" i.e. projected by the various advertisement agencies to facilitate the selling of their products. We tend to get swayed by them and thus create a mental picture of who we should be. We then try to assess our achievements against this extremely subjective benchmark set by ourselves for ourselves. What is urgently required is the realisation that "living life happily" is not necessarily hooked on to acquiring materialistic things. Happiness and contentment is a state of mind and this realisation comes only through introspection. We need to teach ourselves to introspect.

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Abstract:

Road rage is a phenomenon which indicates that society is on edge. Increasingly, aggression and violence has appeared to drift further into mainstream Indian society. Stories of school shootings, workplace violence, violence on the airlines, and "road rage" abound. Road rage has recently been cited as equalling alcohol-impaired driving in the number of resultant motor vehicle accident related injuries and fatalities [Martinez, 1997 and Snyder, 1997]. The probability of becoming a victim on the roadways is significantly increased by the average exposure of the individual on the road. Presently Indian roads and driving conditions are a point of discussion moreover no comprehensive data is available to how many persons die or are injured due to road rage cases. In the last three years in the capital of India sudden provocation prompted people to kill or physically assault each other .In 2005-2006 it topped the list of murder motives. In 2007 it was the second highest cause in murder list.

This paper discusses results of opinion survey of experts as well as of the drivers/ commuters, detailed analyses of the causes and time-wise, vehicle-wise, location-wise aggressive behaviour among drivers. Paper further highlights action plan for mitigating measures for reducing aggressive behaviour among Indian drivers.

Author Keywords: Aggression; Road rage; Violence.

1. INTRODUCTION

A report from the World Health Organization and the World Bank (2004) on road traffic accidents and injuries estimated 1.2 million people are killed in road crashes each year and as many as 50 million are injured worldwide. There is substantial body of work on risk taking behaviour (Turner et al., 2004), socio-economic factors (McLeod et al., 2003) and driving history in relation to road traffic accidents. Turner and McClure reported that high incidence of motor vehicle crashes among young males was related to their risk taking behaviour. Apart from medical costs, damage to property and loss of productivity adds to the cost impact (Lin et al., 2003). A decade's worth of saving the Rs. 50,000 million estimated loss in traffic accidents every year could buy the country a 7,000 km-long, six-lane national highway at today's rates. That would cut

back on the Rs 300,000 million India loses every year due to road-related mishaps, freeing a sea of finance for the social development sector, including disaster management. According to the World Disasters Report 1998, 'The economic cost of road accidents is equivalent to approximately one per cent of the Gross National Product.'

Presently Indian roads and driving conditions are a point of discussion moreover no comprehensive data is available to how many persons die or are injured due to road rage cases. Road deaths in India registered a sharp 6.1% rise between 2006 and 2007. However, road safety experts say the real numbers could be higher since many of these accident cases are not even reported. ''There is no estimate of how many injured in road accidents die a few hours or days after the accident,'' points out Rohit Baluja, member of the UN Road Safety Collaboration and Commission of Global Road Safety Report representing Asia. The report, based on 2006 and 2007 statistics collected from 178 participating countries, said globally over 1.2 million people die in road accidents every year and 20-25 million people suffer non-fatal injuries. The report pointed to speeding, drinking-driving and low use of helmets, seat belts and child restraints in vehicles as the main contributing factors. In 2004, road accident was the top ninth cause of death in 2004.

In the last three years in the capital of India sudden provocation prompted people to kill or physically assault each other .In 2005-2006 it topped the list of murder motives. In 2007 it was the second highest cause in murder list. According to Delhi Police "The most chilling examples are cases of violent road rage when people hit each other due to minor fights…." According to doctors such erratic and potentially dangerous behaviour is a medical problem which is called Intermittent Explosive Disorder (IED) which is significantly different from foul temper and it affects up to one in 20 people more men than women. Doctor Rajesh Sagar, Associate Professor, Department of Psychiatry, AIIMS says "People suffering from IED can go to extremes without understanding what they are doing. People do not realize the intensity of the problems until they commit a violent act. They can take it out in two different ways on others or on themselves" (Bajpai, 2008).

Some behavioural factors were significantly associated with having been involved in an accident: tailgating, getting angry with other drivers, aggressive behaviour, encounter with the police and being warned for poor riding. The accident involved rate associated with reporting 'yes' for

each of behaviours was above 20% and was as high as 39% and 43% for aggressive behaviour and encounter with police, respectively .

The National Highway Traffic Safety Administration (NHTSA) distinguishes road rage from aggressive driving by classifying aggressive driving as a traffic offense and defining it as "the operation of a motor vehicle in a manner which endangers or is likely to endanger people or property" while road rage is classified as a criminal offense and is defined as "an assault with a motor vehicle or other dangerous weapon by the operator or passenger(s) of one motor vehicle on the operator or passenger(s) of another motor vehicle or vehicles precipitated by an incident which occurred on a roadway"(Martinez, 1997).Aggressive driving is an apparent cause which aggravates the road rage cases. The term "Road Rage" was first coined in 1988 (Fumento, 1998) and is defined in the 1997 Oxford English Dictionary as "Violent Anger Caused by the Stress and Frustration of Driving in Heavy Traffic." Some researchers suggest this definition is not entirely accurate. For example, road rage has been described as a cultural habit of retaliation that occurs as a result of frustration and independent of heavy traffic (James & Nahl, 1998). Some scientists suggest the road rage as a mental disorder (Schmid, 1997). Elevated levels of anger may prompt aggressive and other risk-taking behaviour, that can increase accident risk, and risk of other deleterious behaviour such as physical assault between drivers or argument with passengers (Deffenbacher, Oetting, & Lynch, 1994).

Stradling & Parker, 1997 define aggressive driving by grouping driving behaviours into three categories: lapses, errors, and violations. Lapses are exemplified by such behaviours as pulling away from the curb in third gear, or switching on one control when trying to turn on another. Errors include failure to see a sign, misjudging a distance, etc. Violations involve intent and are related to aggressive driving such as disregarding the speed limit, running a red light, or tailgating. Violations aggravates the anger and frustration among the fellow road users or drivers which turns up into personal attacks on fellow drivers such as obscene gesturing, verbal insults, throwing objects, and, in extreme cases, physical assault. Such behaviours tend to be reciprocated quickly, and a relatively minor infraction can quickly escalate into a major altercation resulting in injury, property damage, or even death (Maiuro, 1998).According to the Additional Commissioner of Police Licensing, New-Delhi, "Road Rage is momentary insanity arising out of irrational anger due to the emotional load of frustration which an individual is carrying. The point at which the road rage occurs is just a trigger, which brings forth the accumulated

tensions, pressure and frustrations in the mind of an individual to be forefront.”

In India, to date, there is no work published on risk taking behaviour and road rage incidence and related mitigation measures nor an objective record of driving with regard to road traffic accident. There is a need to develop an agreed conceptual framework for examining the above factors using appropriate parameters and measurable variables by systematic approach. This study attempts to provide evidence of several factors leading to road rage and how they lead to an accident. This can be used to control or modify the risk behaviours, build public health interventions like policy making on road safety measures, education and health. It might help devise methods to minimize or avoid consequences of road traffic accidents related to road rage.

Road Rage Incidences

Road rage stories coming from countries across the globe confirms its proliferation as a random, albeit widespread, form of potentially deadly interpersonal violence. Yet, despite its commonness, road rage presents a series of unique challenges to researchers, making it unlike most other forms of interpersonal violence. First, it usually involves expressed aggression between strangers. Second, it is related in some way to a driving incident. Third, it involves a perceived threat of "invasion" into one's space, and thus, one's identity. Fourth, it is a conflict phenomenon that has yet to secure a universally agreed upon definition. Fifth, there are, by some standards, insufficient quantifiable data documenting its existence. Sixth, theories about its causes abound, proposing an extremely broad range of probabilities. Seventh, the inability to target causes for the phenomenon presents major challenges to resolving it.

1.1. GLOBAL ROAD RAGE INCIDENCES

This brief sampling of road rage stories coming from countries across the globe confirms its proliferation as a random, albeit widespread, form of potentially deadly interpersonal violence. Yet, despite its commonness, road rage presents a series of unique challenges to researchers, making it unlike most other forms of interpersonal violence.

1.1.1 Brief Case Histories of Road Rage Incidences

- In Mississauga, Canada a driver of a van was run over by a pickup truck during the truck driver's fit of road rage (Toronto Star, 17 June, 2000).
- In London, two drivers came to blows over who was going to use the car wash first at a service station in Lightwater (Sunday Telegraph, 02 July, 2000).
- In Israel, a driver was beaten to death after he cut off another driver in traffic (Los Angeles Times, 1 July 2000).
- In Jerusalem, July 1999 saw the stabbing death of a 36 year-old driver after he asked another driver not to scratch his car, and the knifing of a 50 year-old man by a 19 year-old when the elder driver honked his car horn at the younger driver (The Jerusalem Post, 21 June 2000).
- In Jerusalem, a 28 year-old man was charged in the beating death of a 46 year-old man whom he says cut him off on the road; the elder man was never allowed to emerge from his vehicle, he was beaten to death as he sat behind the steering wheelof his car (The Jerusalem Post, 21 June 2000).
- In Ireland, a car driver became angry after a bus overtook him on the road. Consequently, the car driver pulled in front of the bus, forced it to stop, and attacked it (The Irish Times, 23 May 2000).
- In New Zealand, a 35 year-old driver became irate when he felt he was being followed to closely by another vehicle, in turn, he assaulted the other driver through his open car window (The Southland Times, 31 May 2000).
- In Malaysia, a 30 year-old man who stabbed another man to death over an incident of road rage was sentenced to 10 years in prison (Deutsche Presse-Agentur, 4 July 2000).
- In China, a 44 year-old police officer who killed a 28 year-old man in a fit of road rage was sentenced to death (Agence France Presse, 3 July 2000).
- In India, a popular skating instructor used his vehicle to repeatedly run over, crush, and kill another man with whom he argued over an incident on the road. This incident was preceded by an angry motorist who killed a young girl and dumped her body in a drain and a young man on a scooter who "thrashed" a couple also riding a scooter because he was

enraged that they stopped at a yellow caution light instead of proceeding through it (India Today, 15 May 2000).

- Atlanta, Georgia a two-year old toddler was shot through the neck by an irate motorist engaged in an argument over a road incident with the toddler's father (The Atlanta Journal & Constitution, 30 June 2000).
- In Denver, Colorado a 51 year-old man used a .25 caliber semi-automatic pistol to kill a 32 year-old bicyclist who cut him off on the road (The Denver Post, 21 June 2000).
- In Detroit, Michigan a 34 year-old man said he was attacked with a club by another motorist after the two drivers stopped on the road to confront each other (The Detroit News, 24 May 2000).
- Near Cincinnati, Ohio a 29 year-old woman cut in front of a 24 year-old pregnant woman and slammed on her brakes in an irate gesture following her anger about the latter's driving. The mother-to-be lost control of her car in a violent accident in which her unborn child was killed (Newsweek, 02 June 1997).
- In Florida, a 41 year-old man who pulled into an exact change lane at a toll booth was shot and killed as he exited his truck to confront an irate driver behind him who was annoyed at the 41 year-old's delay in paying the toll (Car and Driver, September 1998).

1.2 FACTORS INFLUENCING ROAD RAGE

Demographic variables (e.g. driver age, gender, experience etc.) are relevant but the focus has been on identifying components of driver personality that predict aggressive driving.

1.2.1 Personality Variables of the Drivers

McGuire, 1956 contributes to the beginnings of personality trait research within the driving literature when he compared accident- and violation-free drivers with accident- and violation-incurring drivers. Using the Minnesota Multiphasic Personality Inventory (MMPI) Hathaway & McKinley, 1951 and the Rosenzweig Picture Frustration Study Rosenzweig et al., 1947, he found that the two groups produced significant differences on these standardized tests. The unsafe drivers scored significantly higher on the Psychopathic Deviate (Scale 4) and the Schizophrenic (Scale 8) scales of the MMPI. Likewise, the unsafe drivers produced significantly

higher scores on the Ego-Defensive and Need-Persistence Scales of the Rosenzweig. Neither groups' scores were in the clinical range for either test. Item analysis indicated that the unsafe drivers endorsed responses that were more aggressive, less conservative, less mature, less conscientious, and more antisocial in nature. Tailgating, honking horn showing anger, yelling or making angry gestures are the examples of personality factors which have been implicated in aggressive driving which include sensation seeking, impulsiveness, and trait driving anger (Dahlen et al.2005; Jonah, 1997; Schwebel et al, 2006). Sensation seeking factor contributes to the prediction of aggressive driving, risky driving, and losses of concentration, moving citations, and motor vehicle accidents beyond driving anger alone Dahlen and White (2006).

Personality variables and the incidence of psychopathology in traffic accidents were investigated by Tsuang et al., 1985. They reviewed the literature in order to compare non psychiatric and psychiatric populations in an attempt to examine the roles of personality factors, Axis I disorders, suicide, life events, alcohol, and drugs in traffic accidents across populations. Tillman & Hobbs, 1949 had first studied the relationship of traffic accidents and personality traits and concluded, "a man drives as he lives." Subsequent research often bore out this conclusion with some contradiction. In their review, Tsuang et al. found noticeable trends for associations between higher incidents of traffic accidents and certain personality characteristics. Such characteristics in non psychiatric populations included less control of hostility and anger, less tolerance of tension, less maturity, less conformity, more difficulty with authority, more hyperactivity, more belligerences, and a tendency to take risks. Higher accident rates are reported among criminal samples. The authors note the crossover of many reported personality characteristics with characteristics of borderline and antisocial personality disorders. The role of psychopathology in traffic accidents was found more discrepant in their review of the relevant literature. The authors report general agreement concerning the reports of higher incidence of traffic accidents in patients with diagnosed personality disorders and paranoid ideation. The reviewed studies differed widely on their findings of relationships between psychotic and neurotic disorders and the incidence of traffic accidents. The authors also note that risk-taking and hyperactivity (defined by the author as aggressiveness, impulsiveness, and disrespect for authority) are associated with higher incidence of traffic accidents.

In addition to personality traits and the occurrence of Axis I disorders, state and trait aspects of affect and mood may have an effect on driving

behaviour. [Groeger, 1997] speculated that depressed individuals might be expected to perform more sluggishly at the wheel. He based this supposition on the body of research concerning mood and memory. In this research, mood has been seen to affect the ability to learn and retrieve information. Similarly, a driver experiencing high anxiety may commit more driving errors. A hostile mood may also affect driver performance and lead to aggressive driving behaviours. Overall, in investigating these questions, the author found that during a driving test, increases in hostility alone appeared to be related to deficits in performance. Specific driving behaviours, which are emitted in relation to any given mood state, require further investigation. This preliminary research points out the necessity of taking transient (state) and trait moods into account when conducting research into driving behaviours. Certain personality variables, traits, and characteristics may be associated with more driver stress, which may lead to increased aggression and, in turn, lead to a higher incidence of traffic accidents. More accidents certainly increase the risk of injury, property damage, and fatality.

Results from the SUNY-Albany program have indicated a high rate of both Axis I and II psychopathology within a community sample (court-referred and self-referred) of aggressive drivers [Galovski & Blanchard, 2002 and Galovski & Blanchard, in press]. Using the clinician-administered, standardized Structured Clinical Interview for DSM-IV Axis I and II disorders [First et al., 1994 and First et al., 1995], it was found that 80% of the 30 participants met criteria for at least one Axis I disorder and 57% met criteria for at least one Axis II disorder. Notably, 33% of the population met criteria for intermittent explosive disorder (IED)—the only Axis I disorder to currently hold anger as its hallmark feature. When compared to a control, nonaggressive driving population, it was found that the aggressive drivers (AD) exhibited significantly more overall Axis I and II psychopathology. With respect to specific disorders, the AD population was diagnosed significantly more frequently with IED, alcohol abuse, substance abuse, antisocial personality disorder, and borderline personality disorder.

These results suggest that significant psychiatric distress exists in the aggressive driving population. Of course, we cannot submit each potential driver to a personality screening test. However, knowledge gained through these types of profiling studies does inform the type of interventions we use to correct aggressive driving behaviours. For instance, in discovering the elevated levels of IED in the Albany program, this was surmised that future interventions should particularly target

impulsivity. In the Albany program, certainly entrenched personality disorders were observed that may directly contribute to aggressive driving or at least predispose a person to drive aggressively. This was observed that aggressive driving was more of a poor coping skill, albeit a dangerous one, in response to stressful life events. Bringing this point to their attention and offering them alternative coping skills often went far in helping to remedy the problematic behaviour. Predisposing antisocial personality traits, as a response to environmental stress, the relative anonymity and quick getaway that the automobile provides and individual variables, such as age, gender, social status, and ethnicity, all have been identified as contributors to aggressive driving. Researchers have also explored psychological variables or characteristics of drivers in order to identify certain personality types or profiles that typify the aggressive driver. Personality types (e.g., the Type A or coronary-prone behaviour type) may exacerbate the experience of stress and contribute to aggressive driving behaviour. The tendency to drive aggressively thus may be inherent in a person much like a personality trait, or may be more transient and dependent on a given mood and the day's circumstances. For example, it may be the case that the typical aggressive driver is a generally hostile individual who perceives the world and its inhabitants negatively across situations. Or, on the other hand, the average aggressive driver may be a busy person in a hurry to complete a task. This latter person may emit aggressive behaviours subsequent to a frustrating stimuli or a thwarted goal-directed activity. Thus far, little is known about the persona we commonly refer to as the aggressive driver.

Personality traits inherent in drivers might affect driving behaviour through a number of pathways. Matthews et al., 1991 review several pathways in which personality traits influence driving behaviour. Different personality traits have been shown to influence cognitive appraisals of events, levels of arousal, preferred level of stimulation, sensitivity to reward/threat cues, and more generalized stress syndromes. Conversely, it is possible that the individual's personality could be formed or altered based on driving experience (long-term exposure to traffic impedance or commute). Various approaches to differentiating and categorizing types of aggressive drivers in the literature have been employed.

Larson, 1996a and Larson, 1996b categorizes aggressive drivers into five types. The speeder refers to the driver who races against the clock. This person's goal is to reach a given destination as quickly as possible and "make good time." When these efforts are thwarted or obstructed, this driver quickly becomes angry. The second category of drivers is termed

the competitor. This driver attempts to bolster self-esteem by creating contests out of driving situations and attempting to "beat" other drivers in given situations (i.e., will attempt to race another driver at a neighbouring toll booth to get through first). Losing these battles increases the competitor's anger and aggressive driving behaviour. The third category involves the passive aggressor. This driver thwarts other drivers' attempts to pass, drive faster, merge, etc. This type of driver feels that giving in to another driver results in loss of status or self-esteem. Although this driver may not speed or tailgate, preventing others from achieving their goals increases anger in the latter and thus increases the hazard on the road just as effectively. The fourth type of driver is termed the narcissist. This driver sets rigid standards regarding proper driving behaviour and feels angry when infractions of these standards are observed in others. These infractions may include actual driving behaviour or characteristics of a given driver like sex, age, type of car, etc. Finally, the vigilante refers to the driver who is a self-appointed jury, judge, and enforcer of fellow drivers. This driver feels justified in punishing infractions of traffic laws and will engage in a spectrum of punishing behaviours, from shouting and swearing and obscene gesturing to cutting off drivers and even killing other drivers.

Researchers have also taken a more empirical approach in identifying aggressive driver profiles. A study conducted by [Gulian et al., 1989] considered the role of locus of control and attentional styles as they relate to driver stress. These authors found a lack of impact of controllability of driving situations on driver stress. This finding contradicts previous research [Schaeffer et al., 1988] in other domains in which feeling in control of a situation modifies stress levels. The attentional styles of individuals was related to driver stress in this study in that cognitive failures (failures in perception, memory, and motor function) were associated with the dimensions of aggression in driving and dislike of driving.

A follow-up study by Matthews et al., 1991 investigated more molecularly the relationship between individual differences in driver stress (as identified by their DBI; Gulian et al., 1989) and personality dimensions across four studies. The first study associated driver stress to three major personality dimensions: extraversion, neuroticism, and psychoticism (as identified by the Eysenck Personality Questionnaire, Eysenck & Eysenck, 1975). Neuroticism proved to be the strongest predictor of driver stress and was positively correlated with aggression in overall driver stress. Psychoticism was also positively correlated with aggression. These

findings suggest that personality traits, especially neuroticism, may play a role in predisposing an individual to driver stress that may result in aggressive driving. A follow-up study indicated that neuroticism is associated with relatively ineffectual coping strategies Dorn & Matthews, 1992. Subjects who ranked high in neuroticism reported significantly greater incidences of aggressive and confrontative strategies. The authors suggested that ineffective coping strategies might mediate the relationship seen between neuroticism and driver stress.

Matthews et al., 1991 addressed more detailed individual differences in frustration and irritation on the road. The authors identify the driver's predisposition to hostility and aggression as possible antecedents to irritation and anger on the road. This irritation and anger frequently results in aggressive and hostile behaviours toward other drivers Turner et al., 1975. Results of study revealed that aggression were strongly correlated with hostility as measured by the Buss–Durkee Hostility Inventory Buss & Durkee, 1957. Thus, the physical or verbal act of aggression in driving was strongly related to a predisposition to hostility in general.

Study is focused on the cognitive aspects of driving and the effects of the beliefs of an individual about driving competency and the ability to cope with driving situations. These authors theorize that believing oneself to be less competent in driving results in greater overall driver stress. Results are consistent with this hypothesis that believing oneself to be less competent on the road was associated with higher levels of reported driver stress.

Some studies have found that conscientiousness is inversely related to motor vehicle accidents and moving violations (e.g. Arthur and Doverspike, 2001; Arther and Graziano, 1996). The relative neglect of positive personality factors overlooks a number of potentially useful variables which could inform prevention or intervention programs.

1.2.2 Environmental Factors

Most drivers, at one time or another, experience heat, pollution, noise, and other driving-related stressors. Other investigators studied less interpersonal variables as contributors to aggressive driving. Aggression can be conceptualized as occurring within a larger context. Research into the context of the environment at large has included the interaction of environmental stress and driver aggression. Anger, which has been seen

to be related to aggression, has been defined in research and clinical settings as a form of strong arousal activated by a proximal event. There is a need to consider not only proximal cues to anger, but also to identify distal and contextual cues. In considering an anger-provoking situation, the context of the situation must be appraised (Novaco, 1993).

Novaco 1993 suggests using three themes towards the assessment of anger in a given context. The first theme is termed "embeddedness" and refers to the understanding of the construct of anger as being connected across space and time by influencing variables that occur across settings. An example of such a variable might be the general economy. Financial stress resulting from a poor economy may impact interpersonal domestic relationships (arguments about spending), the ability to engage in extracurricular activities, higher gas prices, etc. Thus, anger may manifest itself in a particular situation such as driving, but may involve frustration from a more diffuse stressor such as economic concerns. Economic strain impacts the driving situation in a number of ways. For instance, financial difficulties prohibit an individual from purchasing a comfortable car. Job location frequently does not correspond to desirable housing in proximity. Thus, anger and aggression during commutes may be embedded within the larger transportation, residential, and economic contexts.

The second theme is called "interrelatedness" and refers to the reciprocity in which anger influences other behavioural and environmental elements over time and vice versa. In this sense, anger is surrounded by previous occurrences and greatly influenced by past experiences. For example, rush-hour traffic and stress from work may contribute to interpersonal difficulties in the home. When the interpersonal difficulties are the sole focus of attention, the larger contextual contributors (work stress and rush-hour traffic) may be overlooked.

[Novaco, 1993] describes the third theme as "transformationality," which refers to dynamic change processes occurring with anger. For instance, through positive feedback cycles, angry encounters can produce escalation effects that, over time, transform behaviour patterns. For example, honking the horn in annoyance may be isolated incidents for some drivers, but may escalate to involve a family of annoyance behaviours that include more serious acts of aggression over time. Although these themes are primarily theoretical in nature, the author does draw upon empirical literature from a variety of areas of scientific inquiry to support his views (for a further review of this literature, see [Novaco, 1993]).

The emphasis on the economic and environmental consequences of the increases in traffic and general congestion has left the cumulative emotional, behavioural, and physical consequences of increased travel relatively neglected. However, the relationship between the environmental context and driving stress has been investigated in a number of studies. Road design, intra -vehicular discomfort, such as noise and heat, air pollution, road quality, commuting time, overcrowding, and congestion, are some of the environmental influences related to driver stress Stokols & Novaco, 1981. These aversive conditions, which occur with some regularity during daily driving situations, are considered stressful by virtue of their impedance properties. Travel impedance is thus defined as behavioural constraints on movement and goal-directed activity, which is an aversive and frustrating condition. Routine exposure to such accumulated stress negatively impacts physical health, interpersonal relationships, and occupational functioning. In particular, travel impedance over time (as in daily commute) was related to stress reactions as measured by physiological arousal, negative mood, and performance deficits.

Because of the relative paucity of research on aggressive driving per se, related research must be reviewed for a better understanding of the contextual dynamics involved. Research on driver stress has provided some insight into patterns of driving within a larger context. In addition, across a variety of fields of scientific inquiry, environmental stressors have shown a linear relationship to aggressive behaviour. As Rule & Nesdale, 1976 summarize, a number of environmental stressors to which humans are exposed have adverse effects on human behaviour. Specifically, stressors can lead to aggression. Such variables reviewed include noise, density (as in overpopulation and crowding), temperature, and humidity. Although the existence of these stressors does not necessarily directly cause aggressive behaviour, stress has been shown to contribute to increased aggression in a multitude of studies. Thus, stressors can be conceptualized as aggressive cues, which accumulate or combine with other ingredients to produce aggressive responses. For instance, environmental stressors can predispose an individual to react with excessive aggression to a perceived frustration or insult. The experience of driving in a car during rush hour twice a day, 5 days a week encapsulates all of these environmental stressors (noise, pollution, density, and temperature) along with the added effect of time. It is not improbable to conclude that these stressors contribute significantly to the variance of aggressive driving behaviour.

Gulian et al., 1989 investigated the association of driver stress and coping strategies. The authors postulated that driver stress be conceptualized in one of two seemingly interrelated ways. First, driver stress can be thought of as a measurable response to a specific driving situation. Second, driver stress can be considered, in a broader sense, to be a result of a more pervasive personality trait found in given individuals. Driver stress was seen to occur on two levels: situationally or as an accumulation of negative feelings and frustrations related to the driving experience. Each level exacerbates and reinforces the other in a reciprocal manner. Results of this investigation supported previous research indicating that general life situations and the environmental context influence driver stress. These authors found that the interpretation of other drivers' behaviours (including aggressive behaviour) was the number one cause of stress in their driving sample. Most importantly, these investigators found that 42% to 75% of responses to driver stress involved aggressive driving behaviours. In conclusion, the authors highlighted the need for intervention strategies aimed at reducing aggressive behaviours as responses to driver stress.

The daily commute affords the researcher the ideal naturalistic site to investigate the relationship of driver stress and subsequent aggression. Previous research conceptualized the degree of commuting distress, as measured by self-reported distress, heart rate, and blood pressure, and performance deficits, to vary as a function of the degree of impedance in travel Novaco et al., 1979, Stokols & Novaco, 1981 and Stokols et al., 1978]. More recently, [Schaeffer et al., 1988] examined the effects of chronic low-level stress of daily commutes on psychological, behavioural, and physiological outcomes. These investigators operationalized travel impedance as average speed during commuting (lower speeds indicated higher impedance). The influence of control over driving situations among commuters was also examined through comparison of single drivers (high control) vs. carpool occupants (low control) and through the existence of primary and secondary routes (high control as a result of a choice) vs. primary routes only (low control as a result of no choice in route). Results indicated that higher levels of impedance were significantly associated with higher systolic and diastolic blood pressure, but not for heart rate or self-report measures of anxiety or hostility. Single and carpool drivers did not differ in their reported mood precommute, but significant differences did emerge on postcommute mood measures. Contrary to expectations, single drivers were significantly more hostile and anxious than carpool drivers. The authors postulated that single drivers might feel a greater

urgency to arrive to work on time. The authors also surmised that lack of social interaction on the commute might account for some of the resulting poor mood. Overall, results indicated that the high impedance work commute is associated with higher systolic and diastolic blood pressure and decreases in behavioural performance. Speed of travel and control over the car's environment also contribute to the stress of the commute. Control over the car's environment seemed to partially offset the stress of a high impedance commute. However, choice of routes and control over which route to take seemed to add stress to the commute. Therefore, locus of control as a factor in driver stress requires further investigation.

Temperature has been investigated as a source of stress influencing hostility while driving. Increases in uncomfortable levels of heat are related to increases in aggression [Baron & Ransberger, 1978]. [Kenrick & McFarlane, 1986] studied the effect of high temperature on interpersonal hostility while driving. Conducting their study during the months of April through August in Phoenix, AZ, these authors arranged for a confederate to block the intersection for 12 seconds. Similar to previously mentioned studies, aggression was measured by horn latency, horn duration, and total number of beeps. Subjects included any drivers who pulled up behind the confederate at the intersection with their windows down (assuming no air-conditioning). The horn measurements were correlated to continuous temperature readings provided by the University's Department of Geography. Temperatures ranged from 88 to 116 °F during the course of the study. **Results indicated a significant, linear relationship between temperature and aggression.**

Stress and negative mood appear to occur frequently in driving situations. As previously noted, today people are spending large amounts of time in the car on both a daily and an annual basis. The cumulative effect of stress from driving can clearly be considered substantial. Thus, everyday life stressors coupled with common stressful driving situations can create a climate ripe for aggressive driving. This accumulation of stress, along with related aggressive driving behaviours [Schaeffer et al., 1988], may be contributing to aggressive driving and possibly increasing the risk of motor vehicle accidents.

1.2.3 Social Factors

A number of factors have been identified as causing or contributing to these driving behaviours known as aggressive driving. In the relevant literature, the social significance of the automobile, as well as social and

interpersonal factors involved in driving, have been somewhat neglected in favor of individual factors (i.e., reaction time) and the manipulation of various stimuli [Knapper & Cropley, 1981]. Thus, while a wide breadth of literature on the mechanics of driving exists, a relative paucity of research is found on the personological variables contributing to anger on the roads and the resulting aggressive driving behaviours. A number of these variables, such as perceived social class (status), gender, ethnicity, perception of aggression, and age, have been seen to play a significant and often overlooked role in the development, maintenance, and exacerbation of aggressive driving behaviours.

In a remark on humans' fascination with the automobile, [Marsh & Collett, 1986] note the many drawbacks to the automobile. The average speed of many commuters is slower than the horse and buggy. Cities are blanketed with dense covers of smog from the pollutants spewed out by automobiles. Roadways cut through beautiful countryside and consume huge portions of cities at the expense of peoples' homes and businesses, and as well as account for thousands of injuries and deaths. Yet, despite the negative consequences of the automobiles, people choose to spend hours in traffic jams instead of alternative transportation, spend thousands of dollars on their automobiles, and cope with the plethora of everyday hassles and expenses of owning a car. The answer to this seeming contradiction, as put forth by these authors, does not lie in the political or economic arenas, but instead in the psychology of the car. One important feature of this human–car relationship is the social status that the car symbolizes.

[Doob & Gross, 1968] examined the role of social status as associated with cars and aggressive driving behaviours. They hypothesized that high status implies the ability to exercise sanctions. Thus, the fear of retaliation from a high status individual would prevent a low status individual from engaging in aggressive behaviours when faced with a higher status individual. In order to investigate this hypothesis, the researchers stopped either old (low status) or new (high status) vehicles at an intersection, effectively blocking subsequent cars' passage. Horn latency (time it took for blocked vehicle to sound horn), frequency (number of beeps), and duration (length of beep) were measured. The make, model, and year of the blocked car were recorded along with characteristics of the occupants of the blocked car including sex, estimated age, number of occupants, and number of subsequent cars behind the blocked car. Thirty-eight subjects comprised the low status condition with 36 in the high status condition. In the low status condition,

84% of the subjects honked at least once compared to 50% in the high status condition. Subjects also waited longer on average to honk at the high status car that was blocking their passage. Status thus appeared to have an inhibitory effect on aggression in that subjects tended to exhibit less patience and more aggression (as measured by honking) toward a low status vehicle.

Replicating the [Doob & Gross, 1968] study, [Deaux, 1971] investigated the sex of the frustrator in addition to the previously investigated status and sex of the frustrated subject. Similar trends for status were found as compared to Doob and Gross' study. However, these trends did not reach statistical significance. Sex of the frustrating driver was found to be the most influential variable. Fifty-two percent of all drivers honked at the frustrating car when driven by a male as opposed to 71% of drivers honking at a car driven by a female who engaged in identical frustrating behaviour. Differences in the sex of the frustrated subject emitting the behaviour of honking were not found to be statistically significant. The lack of sex differences in aggressive driving is further supported by the results of the survey by [Turner et al., 1975] mentioned previously. These authors had found that, overall, aggressive driving and provocation on the roads did not differ significantly between men and women. However, trends indicated that women engaged in more covert and less detectable forms of aggression (losing temper, feeling as if they could kill the other driver, feeling annoyed at lack of turn signalling, and swearing out loud) than men. Conversely, men tended to engage in more overtly aggressive behaviours that could be detected by other drivers (flashing headlights in anger, making rude gestures, giving chase to another driver, and retaliating in some way to another aggressive driver).

Further replications of this study yielded different results. [Chase & Mills, 1973] found that newer cars produced more honking (opposite effect for status) and found no significant effect for sex. Their study was conducted 10 years later and in a different region of the country possibly accounting for some of the differences in the results. [Hankes-Drielsma, 1974] replicated the original study in Canada and measured an ethnicity factor by prominently displaying a clear symbol of ethnic identification. Honking was found to have significantly shorter latencies in the vehicle that did not display an ethnic symbol.

[Turner et al., 1975] used similar methodology in investigating the role of a prominently displayed symbol of aggression (a gun in the rack located in plain view of the subject's car) as well as a variable of dehumanization

or anonymity (visibility of the driver). The investigators arranged to have a truck, with a visible gun prominently displayed in a gun rack paired with an aggressive or nonaggressive bumper sticker, block the intersection. The mutual visibility of both the subject and the confederate was varied by either pulling a curtain over the rear window to effectively block the view of the driver or by leaving the curtain open. Results indicated that the male subjects were more likely to honk at an anonymous individual supporting the hypothesis that inhibitions towards aggression are lowered when the victim is dehumanized (through anonymity). When the gun was paired with the aggressive bumper sticker, horn-honking responses were modified. In the case of the visible gun paired with the aggressive bumper sticker and an anonymous driver, more rapid horn-honking ensued. These authors surmise that aggressive stimuli may provoke aggressive responses, or that the stimuli may serve as a retrieval cue and cause subjects to recall unrelated incidents of aggression. [Ellison et al., 1995] also found that anonymity of drivers blocking traffic resulted in shorter honking latencies, longer honk duration, and more frequent honks as compared to visible drivers. The greater degrees of aggression observed in the conditions of the anonymous driver supports [Milgram, 1965] findings that a subject is more likely to aggress against an anonymous victim than against a visible victim.

Age was found to have a negative relationship with driver stress and aggression in several studies. [Matthews et al., 1991] found that age was negatively correlated with several dimensions of driver stress. **Older drivers generally reported lower overall levels of stress. Younger drivers reported a higher rate of aggression and more negative reactions about being overtaken and overtaking other cars.** These findings replicated previous research conducted by the same investigators reporting that younger individuals report more daily stress in driving during commuting. As a result of more stress, younger drivers were seen to use more inefficient coping strategies (especially aggressive driving behaviours) as compared to their older driving counterparts [Gulian et al., 1989 and Gulian et al., 1990].

Driving style of the drivers exhibits the cultural background. In a cultured road site with a police patrolling car in sight, a driver refrains from acting on the aggressive disposition but a road site with no police in sight, same driver is likely to honk at the fellow drivers and then crosses the intersection even if the light has changed to red. Tillman & Hobbs (1949) found that high degree of socio-pathology i.e. greater involvement with courts, police, jail, collection agencies are correlated with high-crash rate

taxi drivers as compared to crash-free taxi drivers. They found that crash-involved drivers exhibited more aggressive behaviour, than crash-free drivers.

1.2.4 Road Conditions:

One common source of frustration and aggression is **congestion**. Driver frustration in congested road conditions, uneven road surfaces and unrepaired/broken road conditions may lead to an increase in aggressive driving and a common cause of road rage.

Given this approach, to reduce or eliminate aggressive driving by treating its causes rather than its carriers (especially when driver surveys suggest that aggressive driving characterizes the majority of the driving population) the first task is to identify **the source of the frustration.** It is a fair assumption that the frustrated goals in driving are efficient mobility and pleasure. Automobile manufacturers and highway designers certainly believe these are relevant goals since they are promoted in advertisements, in cars people buy, and in routes people choose to drive. Yet, with more registered vehicles than licensed drivers, and when most drivers want to use the roads at similar times, one has to observe how both goals are frustrated.

The situational sources of the frustration are the same factors that cause congestion: blocked path of travel by other cars, red signal lights, insufficient number of lanes for the volume, discourteous drivers, and the tendency of many people to organize their work–recreation cycles around the same times and similar routes.

The driving aggression studies are not conclusive with respect to the effect of gender. In a meta-analysis of 143 studies that examined gender differences in aggressive behaviour, Hyde (1984) found **women are less likely to exhibit extreme aggression, but possibly just as likely to exhibit more subtle aggression**, **and exhibit aggression in more subtle verbal terms.** Doob & Gross (1968) found that male drivers were quicker than female drivers to honk at vehicles stopped at the green light, but did not report differences in the likelihood of honking. Deaux (1971) obtained that drivers of both genders honked more at stopped female drivers than male drivers. On the other hand Hauber (1980) observed that both male and female drivers were more aggressive towards crossing male pedestrians than towards female pedestrians. Lawson (1991)

reported that crash-involved red light running drivers were more likely to be males.

If a better understanding of roadway and environmental factors taken care of that induce irritation and contribute to aggressive driving then road rage cases may be reduced.

1.2.5 The impact of the automobile

Globally, the advent of the automobile in the 20th century has dramatically altered the occupational, social, interpersonal, economic, and environmental realms of individual countries to varying degrees. Global explosion of vehicle ownership and usage over the years has been the main cause of roadway congestion, bringing with it more motor vehicle accidents resulting in economic loss, injury, and death. As early as 1940, traffic statistics indicated that death rates increase with auto registration in a linear fashion [Ross, 1940]

Fatalities and injuries resulting from automobile crashes have decreased from 1970 to 1996 in the United States [BTS USDOT, 1998] with the improvements made in transportation safety and public awareness. Such improvements include structural improvements in the highways and secondary roads, technological advances in the safety features of the automobiles themselves, legislation in safety (seat belt laws), and social reform (such as in the area of drunk driving).

Marsh & Collett, 1986 explored aggressive driving behaviours correlated with the automobile. Driver or owner recognizes his automobile as an outlet for social and individual expression. Car sports, car magazines, drive-in movies and restaurants, colours, shapes, sizes, and models across the last century are reflective of economic, political, societal values, and trends at any given historical cross-section of time. As such, not only is the car a symbol of status, but it is an extension of our personalities and values. As much as a car is a reflection of individuality, it also is an outlet for frustration and aggression. In this respect, the car can be used as a weapon. Because the majority of the adult population owns a car, the automobile is not often considered in a dangerous sense. Deaths on the roadways are termed "accidents." People do not think of "arming themselves" when getting in their vehicles. Without the association of aggression and the car, people tend minimize the potential ramifications of driving aggressively.

1.2.6 Age and Aggressive Driving

The relationship between age and aggressive driving seems to be more consistent. Retting & Williams (1996) found that driving through the red light is more common among young drivers. Lawson (1991) in his analysis of red light running crashes, found that the red light violators were more likely to be under 35 years old than the non-violators. Hauber (1980) reported that younger drivers are more likely than older drivers to honk at pedestrians.

The two aggressive behaviours that we studied were running red lights (instrumental aggression) and horn honking at stopped vehicles that obstructed traffic movement at signalized intersections during the green phase (hostile or instrumental aggression). Despite the prominence of the aggressive driving issue in the media, there are still very few empirical studies that directly assessed variables that may affect aggressive driving, and fewer still that used these two behaviours that we studied; namely driving through red lights, and horn honking at drivers blocking traffic at signalized intersections.

A recent study on driving through red lights by Retting & Williams (1996) compared the characteristics of 462 drivers who violated the red light signal with over 900 drivers who did not violate the red light at the same intersection. They found that drivers who drove through the red light were younger, were less likely to use seat belts, and had worse driving records than the drivers who did not drive through the red light. These results are consistent with the numerous studies of crash analyses that find that young male drivers are over-involved in crashes relative to women and older men (e.g. Cerrelli, 1995 and NHTSA, 1996).

Horn honking was first used as an observable dependent measure of aggressive driving behaviour in a field study published by Doob and Gross almost 30 years ago (1968). In their experimental paradigm the experimenter's car was stopped at a signalized intersection, and remained stopped when the light changed to green. They then studied the horn-honking behaviours of the drivers stopped behind the experimenter's car. They rationalized that this is a realistic situation for observing frustration-aggression, since it provides a "clearly identifiable frustrator and a fairly typical response for the blocked driver" (p. 213). Also they noted that horn honking has both an instrumental value (since it may quicken the movement of the blocking car) and an emotional tension-reducing value (since it is an unpleasant stimulus to the driver of the blocking car).

The effects of several independent variables on horn honking have been studied by different researchers. In all of these studies the experimenter's car was stopped at a red signal. When the light changed to green a timer was started and it was stopped when either the driver behind honked the horn or 12 s had elapsed. Special care was taken in these studies to conduct all trials during non-rush hours. In the first study of the kind, Doob & Gross (1968) showed that drivers more readily honked at a low-status car (old Rambler sedan) than at a high-status car (new Chrysler Imperial). In light Sunday traffic the mean delay (for male drivers) was 6.8 s for the former and 8.5 s for the latter. Also males were quicker to honk than women by 1–2 s. Deaux (1971) partially replicated Doobs and Gross' findings and also showed that drivers more readily honked at female drivers than at male drivers, supporting—what they termed—the "damn female driver" stereotype. Turner, Layton & Simons (1976), measured honking behaviour on Saturdays and found a greater likelihood of honking at a blocking pickup truck when the curtain behind the driver was drawn than when it was removed, suggesting that drivers (all males) are more likely to honk when their anonymity is assured than when it is not. Finally, in the most recent study using this measure, Ellison et al., (1995) observed honking tendencies by drivers of convertible cars and 4×4 vehicles with the top up (providing anonymity) and with the top down (with no anonymity). They found that the time to honk was significantly shorter when the driver behind the stopped car was with the top up (6.3–6.5 s) than when he/she were in an open top (9.0–9.6 s). They did not find any differences between men and women.

In all of the above studies, care was taken to conduct the research in non-rush hours. Thus, the very common situation of congestion and (possibly) time pressure was not a factor. The effects of congestion, rush hours, or crowding on driving behaviour, to the best of my knowledge, have not been studied empirically. However there is ample evidence from social psychology and urban anthropology that crowding and congestion lead to increase in violence. The urban plight of most large cities is a testimonial to that. A related issue, that to the best of my knowledge also has not been tested directly, is that people drive more aggressively when under pressure than when they are not under pressure [though in a related study, McMurray (1971) found that people just prior to divorce have a higher crash rate than either much before or after it]. In the traffic scene, time pressure, congestion, and alienation (or anonymity) are often confounded; occurring at the same times and in the same places. Thus we are probably more likely to observe some aggressive driving in

crowded cities during the rush hours than in small towns during the weekends. Some direct evidence for this was obtained by Hennessy & Wiesenthal (1997). In their study, drivers were queried about their mood and behaviours through cellular phones in congested and noncongested traffic. Using structured questionnaires, they found that "state'' stress (as distinguished from "trait'' stress) was much higher in high congestion than in low congestion, and aggressive behaviours (including "swearing'', "purposeful tailgating'', and "horn honking'') were twice as frequent in the high congestion than in the low congestion.

1.2.7. Aggressive Behaviour (Horn Honking) At Stopped Cars At Signalized Intersections

The effect of both situational variables (traffic signal duration, and time pressure) and individual differences (age and sex of drivers) significantly effect on aggressive behaviour (i.e. horn honking) when waiting behind a car when the traffic signal light changes to green. The duration of the traffic signal green and red phases are directly related to the expected time delays, and affect aggressive behaviour. "Time pressure'' by the day time of travel, or driving in weekday rush-hour traffic is more stressful and generate more aggression than weekend driving (Hennessy & Wiesenthal, 1997). Ellison et al. (1995) ; Doob & Gross (1968) obtained moderate correlations between honking delays, number of honks, and duration of honks, and also noted that some drivers revved their engines instead of honking.

1.3 The Need of This Project

This has been observed that relatively low level of attention given the study of road rage, particularly in comparison to the scholarly attention given to other types of violence such as street crime, domestic abuse, and school violence. Keeping in view of the above present project was initiated to defines, quantifies, explains, and implements remedial measures for the road rage phenomenon.

2. OBJECTIVE(S) OF THE STUDY:

The major objectives of the present project were:

I. Time-Wise, Vehicle Wise and incidence wise observation of road rage cases in Delhi
II. Analysis of PADS scale across different age groups, professional groups, gender and driving exposures
III. On the basis of observations and results of rating scales identify the various factors leading to road rage.
IV. Documentation of records.
V. Implementation Plan for preventing road rage.

3. METHODOLOGY

This study was conducted on drivers randomly across age group, qualification, profession and driving exposures with the help of experienced traffic police personnel. Various aggressive driving behaviour parameters were measured by the administration of propensity of aggressive driving scale (PADS). Following steps were adopted in the present study:

- Interview with the Additional CP Licensing, Delhi regarding opinion about road rage
- Field observation of Road Rage incidences
- Data collection by administering PAD Scale on drivers
- Data compilation and analysis
- Report writing
- Planning and Implementation of Mitigation measures

This study was conducted on drivers randomly across age group, qualification, profession and driving exposures with the help of experienced traffic police personnel. Various aggressive driving behaviour parameters were measured by the administration of propensity of aggressive driving scale (PADS).Due to time and manpower constraint the observation area surrounding Delhi and NCR was kept limited.

4. RESULTS AND INTERPRETATION OF TIME –WISE FIELD OBSERVATION OF AGGRESSIVE DRIVING CASES

Field observations were carried out in three phases

4.1 Time –wise field observation and recording of Road Rage incidences and Aggressive Driving cases
4.2 Results and interpretation of vehicle-wise, weather-wise analysis of road rage incidences in Delhi and some NCR areas
4.3 Administering Propensity of Aggressive Driving Rating Scale on Drivers of the selected sample.

4.1 **Time –Wise Field Observation and Recording of Road Rage Incidences and Aggressive Driving Cases**

Time –wise field observation and recording of Aggressive Driving cases were made on NH-8 (near Okhla Bus Depot Phase-II), New-Delhi team members recorded time wise various aggressive driving and road rage incidences for duration of five hours i.e. from 9:15 a.m. to 5 p.m. The main objective of selecting this NH-8 road stretch was to compare aggressive behaviour and risk taking practices of drivers on off peak hours and peak hours. Apart from these several complains were also received from road users about aggressive driving practices shown by drivers of different vehicles on this particular road stretch.

Observations were made on the basis of number of traffic violations and risk taking behaviours (as mentioned below) shown by the drivers of light motor vehicles i.e. car/jeep, three wheelers and two wheelers and heavy motor vehicle drivers:

4.1.1 Number of Red Light Jumping cases
4.1.2 Number of tailgating cases
4.1.3. Number of aggressive Honking Horn
4.1.4. Number of Wrong Side Overtaking

4.1.1 **Observation of Red Light Jumping Cases**

Overall 503 (whole vehicle population) number of red light jumping cases were observed out of which drivers of two wheelers & light motor vehicles were observed maximum violating traffic signals by jumping red lights

(total 239,48% and total 207,41%) as compare to the drivers of other vehicles.

Table 1: Field Observation of Risk Taking Behaviour (Red Light Jumping Cases)

Red Light Jumping								
Time	Car/Jeep	%	T.W*.	%	TH.W.*	%.	H.M.V*.	%
9:15 -10:15 am	44	9	52	10	7	1	0	0
10:30 -11:30 am	38	8	42	8	10	2	3	1
1:30 -2:30 pm	32	6	37	7	6	1	6	1
3:00 – 4:00 pm	40	8	47	9	7	1	7	1
4:00 – 5:00 pm	53	11	61	12	9	2	2	0
Total	207	41	239	48	39	8	18	4

*T.W. =Two –Wheelers, TH.W. =Three-Wheelers, H.M.V. =Heavy Motor Vehicles

Maximum numbers of red light jumping cases were observed during the evening peak hours i.e. between 4.00-5.00 pm while minimum numbers of such cases were observed during afternoon i.e. between 1.30-2:30 p.m. (table-2).

4.1.2 **Observation of Behaviour of Tailgating**

During the period of 9:15 a.m. to 5:00 p.m. total 52 cases of tailgating were observed .One of the interesting observation was the drivers who were high speeding e.g. car/jeep and two wheelers drivers they minimum tailgated as their tendency were to jump red light, high speeding and overtaking the front vehicles.

In such cases out of the total 52 tailgating cases only 4% car/jeep drivers and none of the two wheeler drivers tailgated during this time interval. Comparatively slow moving three wheelers drivers (85%) and heavy motor vehicle drivers (12%) were observed tailgating other vehicle maintaining minimum space with the front vehicle. Also the maximum numbers of tailgating cases were observed during the peak hours between 1:30 p.m. -2:30 p.m. while minimum numbers of cases were

observed during evening peak hours between 3:00 p.m. -4.00 p.m. (table-3).

Table 2: Field Observation of Risk Taking Behaviour (Tailgating)

Tailgating								
Time	Car/Jeep	%	T.W.	%	THREE W.	%	H.M.V.	%
9:15 -10:15 am	0	0	0	0	10	19	1	2
10:30 -11:30 am	1	2	0	0	10	19	2	4
1:30 -2:30 pm	1	2	0	0	11	21	3	6
3:00 – 4:00 pm	0	0	0	0	5	10	0	0
4:00 – 5:00 pm	0	0	0	0	8	15	0	0
Total	2	4	0	0	44	85	6	12

4.1.3 Observation of Behaviour of Aggressive Honking Horn

Overall 107 vehicles were observed aggressively honking horns out of which drivers of heavy motor vehicles were found observed maximum honking aggressive horns as 37% of the total vehicle population followed by drivers of two vehicles and car/jeep as 30% and 26%.

Table 3: Field Observation of Risk Taking Behaviour (Honking Horn Cases)

Aggressive Honking horn								
Time	Car/Jeep	%	T.W.	%	THREE W.	%	H.M.V.	%
9:15 -10:15 am	3	3	6	6	1	1	7	7
10:30 -11:30 am	6	6	6	6	2	2	5	5
1:30 -2:30 pm	4	4	2	2	2	2	8	7
3:00 – 4:00 pm	4	4	9	8	2	2	7	7
4:00 – 5:00 pm	9	8	7	7	4	4	13	12
Total	26	24	30	28	11	10	40	37

Maximum number cases related to aggressive honking horn were observed during the evening peak hours between 4:00-5:00 p.m. while minimum numbers of cases were observed between 1:30-2:30 p.m.

4.1.4 Observation of Behaviour of Wrong side overtaking

Wrong side overtaking were maximum observed in two wheelers i.e. 43% followed by drivers of car/jeep i.e. 23% .It is interesting to observe that high speeding drivers i.e. two –wheeler riders and car/jeep drivers were found maximum overtaking from wrong side.

Table 4: Field Observation of Wrong side overtaking

Wrong side overtaking								
Time	Car/Jeep	%	T.W.	%	THREE W.	%	H.M.V.	%
9:15 -10:15 am	7	9	7	9	1	1	3	4
10:30 -11:30 am	3	4	3	4	2	3	1	1
1:30 -2:30 pm	4	5	10	13	1	1	4	5
3.00 - 4.00 pm	7	9	2	3	2	3	3	4
4.00 - 5.00 pm	2	3	12	15	1	1	4	5
Total	23	29	34	43	7	9	15	19

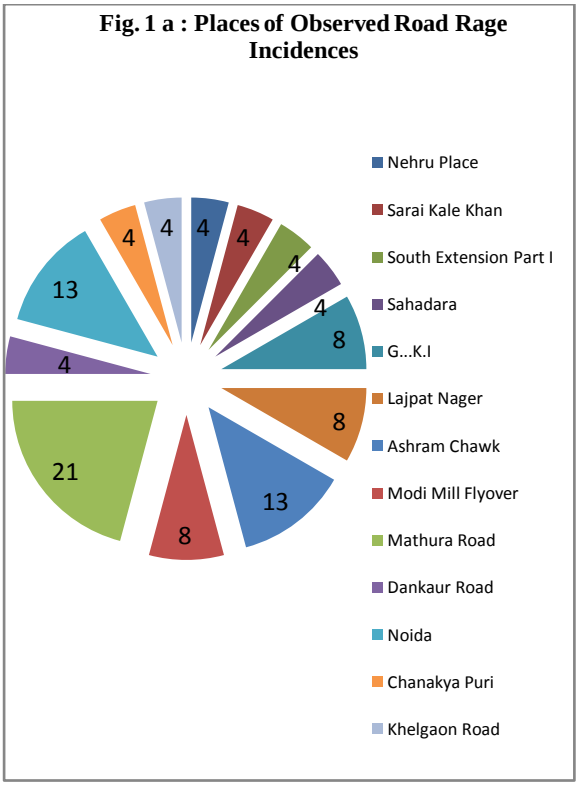
Three wheelers were found minimum overtaking (9%) from wrong side as compared to other vehicles. Maximum numbers of cases were observed during were observed during between 1:30- 2:30 p.m. and 4 p.m. -5p.m and minimum cases were observed between 10:30 a.m. to 11:30 a.m.

4.2 RESULTS AND INTERPRETATION OF VEHICLE-WISE, WEATHER-WISE ANALYSIS OF ROAD RAGE INCIDENCES

Field surveys related to the observation of various road rage incidences were carried out by the research team (which was comprised of police personnel and scientists from the Central Road Research Institute) on Delhi roads for eight months i.e. from October 2008 to May 2009. Out of the total 100 incidences, 24 major cases where some types of physical assaults or aggressive gestures / postures were involved by the aggressive drivers (which are highlighted below) were analysed.

4.2.1 Road Capacity and Enforcement and Perception of Weather Condition

Places of observations and number of incidences occurred at different place of Delhi and NCR areas are shown below (fig.1a,b).This has been observed that those areas where more road rage incidences have been observed, had either lack of proper road capacity leading traffic congestion, lack of working traffic signals or presence of enforcement. According to WHO report only 29% countries had managed to reduce traffic speed in urban areas and only 10% have been effective in managing it. Apparently, weather was clear by the research team. On the basis of this survey this may be assumed road rage incidences are not always related to weather conditions except some exceptional cases.



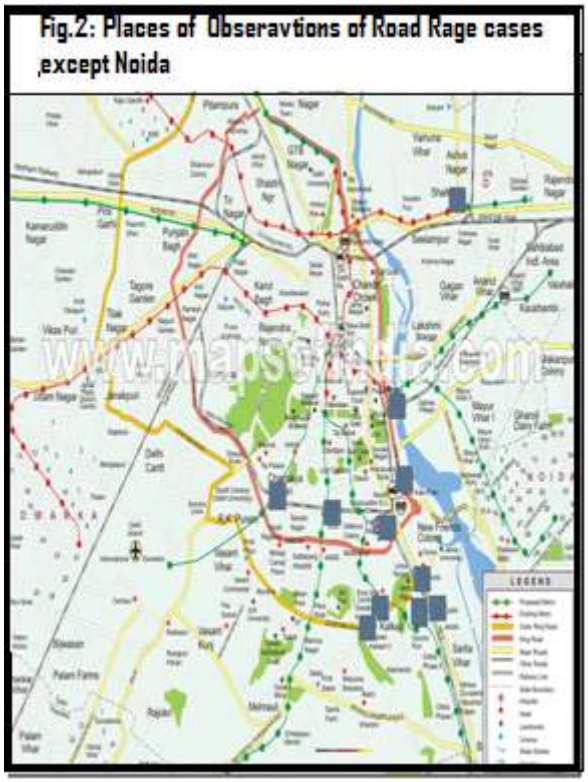
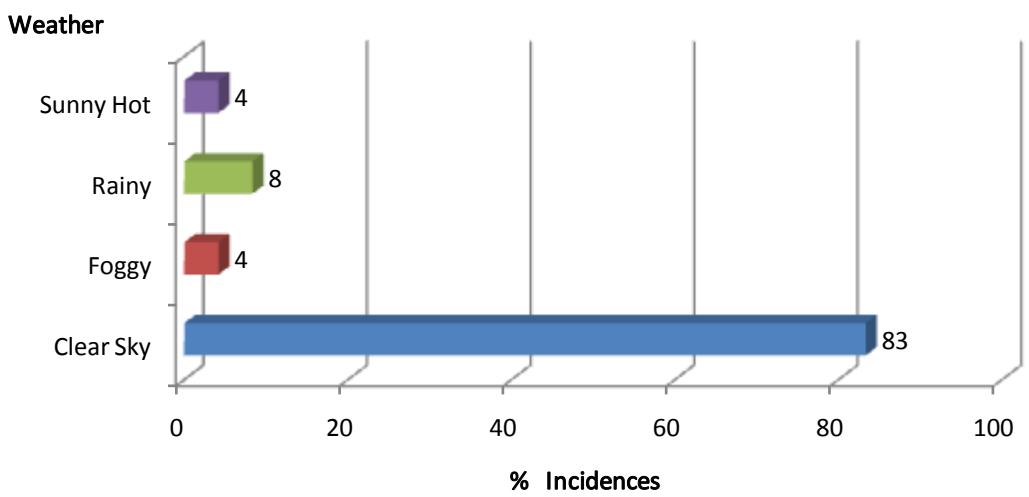


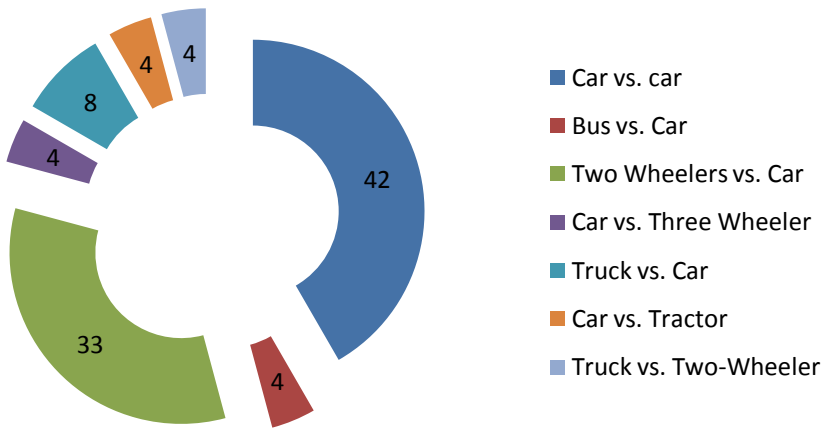
Fig.3: Percentage of of Weather Condition during road rage incidences



4.2.2 Type of Vehicles Involved in Road Rage incidences

During observation it was found that 42% car drivers were involved with fellow car drivers, while car drivers were either involved with two wheelers 33%, 4% with tractors and 4% with buses,4% with three wheelers and 8% with trucks. This shows that car drivers were maximum involved in all types of road rage cases.

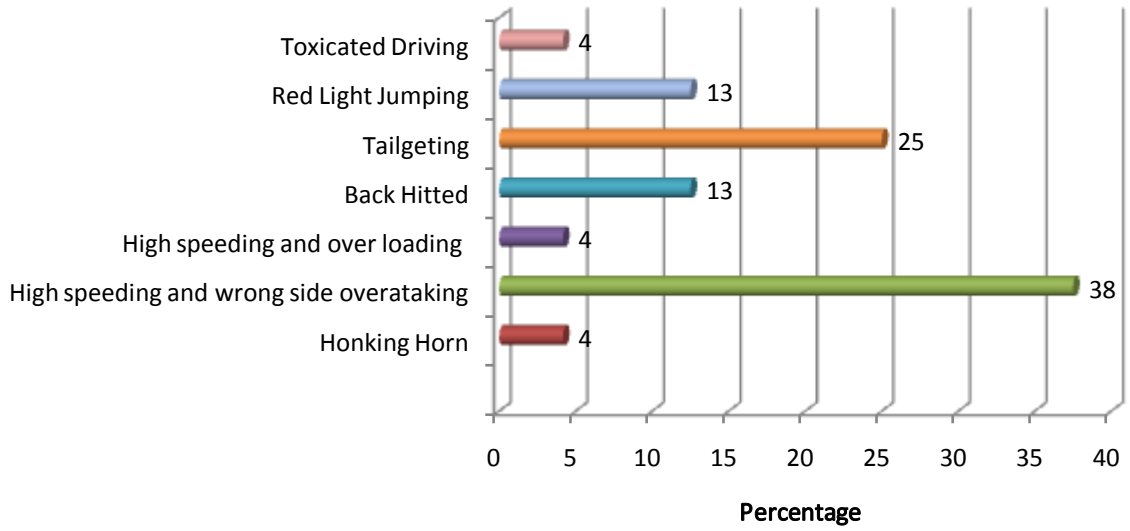
Fig.4: Type of Vehicles Involved in Road Rage incidences



4.2.3 Type of Traffic Rule Violence involved During Road Rage Incidences

Road rage is just a trigger which brings forth all frustrations deposited inside the human mind for any minor incidence which may be any form of violation of traffic rules from either of the parties i.e. victims or aggressor , resulting into physical harm, fatalities and mental assaults. From the survey it was observed that 38% road rage incidences were triggered due to high speeding accompanied with wrong inside overtaking and 25% due to tailgating by any of the parties (victim or aggressor). Other types of violence involved during road rage incidences were red light jumping 13%, hitting from the back 13%,high speeding with overloaded vehicle 4%,aggressive honking horn 4% and driving under influence of alcohol 4%.

Fig.5: Type of Traffic Rule Violence involved in Road Rage Incidences



4.3. THE PROPENSITY OF AGGRESSIVE DRIVING SCALE (PADS):

This scale was developed by Jason P. DePasquale, E. Scott Geller, Steven W. Clarke and Lawrence C. Littleton in 1999 **.** This scale is designed to identify individuals with the greatest tendency to become angry while driving and subsequently engage in hostile driving behaviours or acts of

"road rage." Investigation revealed that the PADS is having adequate test–retest reliability (.91) and validity.

In addition, the PADS is having significant and positive correlations with the Buss–Durkee Hostility Index (BDHI; r=.40) and the trait subscale of the State–Trait Anger Scale (STAS; r=.40). The PADS had a significant correlation with Eysenck's Impulsivity Scale (r=.28). The PAD scale consists of 19 situations in different driving scenario; each driving scenario has four options. Each option has been divided according to the level of intensity of aggressiveness pertaining to the given situations. In this scale level= (0) stands for non aggressive responses shown by respondents, level= (1) for somewhat aggressiveness and level= (2) for very aggressiveness and level = (3) for extreme aggressive behaviour i.e. physical assault and chasing the other fellow driver or other road user.

4.3.1. INTERPRETATION OF RESULTS OF PAD SCALE

4.3.1.1 Sample Size and characteristics:

In the present study 191 drivers from Delhi were randomly selected across different age groups, professions, qualification and driving experiences. In the present sample population 81% were males and 19% were females, age –wise categorisation shows that 3% were from below 18 years 36% were from 19 - 25 years, 30% were from 26-35 years, 15% were from 36-45 years, 9% were from 46-55, 7% were 56 &above. Qualification wise categorisation of sample consisted of 36% graduates,30% post graduates, 14% and 17% were qualified up to higher secondary and secondary level and 3% were only qualified up to primary level. According to the driving experiences 49% were having up to 5 years, 26% were having 5-10 years, 11% were having 10-15 years, 7% were having 15-20 years and 7% were having more than 20 years of driving experience. Profession wise in the present sample 21% were students, 3% were engineers, 8% were business men, 57% were service men, 1% and 10% were housewives and from other types of profession

4.3.2. ANALYSIS OF AGGRESSION LEVELS ON NINETEEN DIFFERENT SITUATIONS

The respondents' task was to select those situation which they had faced in their real life while driving and they had to choose the option which they nearly did while facing those situations. His/her behaviour was rated according to the responses he/she had chosen.

4.3.3 LEVEL OF AGGRESSION SHOWN BY THE RESPONDENTS OF DIFFERENT AGE GROUP

Overall responses of the respondents in all situations of PADS scale were compiled and analysed to observe the age-wise effect of aggression over different situations. On the basis of the data overall maximum aggressive responses were shown by the respondents of 19 to 25 years age group who has shown 12.9% extreme aggressive responses, 23.7% aggressive responses followed by the below 18 years age groups whose parents had provided them their vehicles to drive and some respondents were having motorbikes. These age groups were observed as most vulnerable groups for involving in road rage cases resulting to fatalities and accidents.

Table 6: Level of Aggressiveness Shown By the Respondents of Different Age Groups

Age of the respondents	No Aggression	Somewhat Aggression	Aggression	Extreme Aggression
Below 18	52.6	23.1	16.8	7.5
19-25	38.2	25.2	23.7	12.9
26-35	60.7	19.7	15.4	4.2
36-45	54.9	20.1	17	8
46-55	56.1	30.8	11.5	1.6
56 & above	63.2	22.9	9.8	4.1

Table-7: Analysis Of Variance According To the Different Age Groups

Different Situations		Sum of Squares	df	Mean Square	F	Sig.
Situation 1	Between Groups	36.002	6	6.000	9.142	.000
	Within Groups	120.763	184	.656		
	Total	156.764	190			
Situation 2	Between Groups	43.174	6	7.196	6.289	.000
	Within Groups	209.399	183	1.144		
	Total	252.574	189			
Situation 3	Between Groups	4.665	6	.778	1.581	.155
	Within Groups	90.497	184	.492		
	Total	95.162	190			
Situation 4	Between Groups	6.827	6	1.138	1.976	.071
	Within Groups	105.969	184	.576		
	Total	112.796	190			
Situation 5	Between Groups	13.486	6	2.248	1.886	.085
	Within	219.28	184	1.192		

	Groups	8				
	Total	232.775	190			
Situation 6	Between Groups	44.908	6	7.485	8.778	.000
	Within Groups	156.045	183	.853		
	Total	200.953	189			
Situation 7	Between Groups	12.376	6	2.063	4.947	.000
	Within Groups	76.303	183	.417		
	Total	88.679	189			
Situation 8	Between Groups	5.856	6	.976	2.731	.015
	Within Groups	65.767	184	.357		
	Total	71.623	190			
Situation 9	Between Groups	5.905	6	.984	2.740	.014
	Within Groups	66.084	184	.359		
	Total	71.990	190			
Situation 10	Between Groups	17.707	6	2.951	3.402	.003
	Within Groups	159.592	184	.867		
	Total	177.298	190			

Situation 11	Between Groups	6.775	6	1.129	5.755	.000
	Within Groups	36.104	184	.196		
	Total	42.880	190			
Situation 12	Between Groups	32.460	6	5.410	5.865	.000
	Within Groups	168.803	183	.922		
	Total	201.263	189			
Situation 13	Between Groups	11.881	6	1.980	4.729	.000
	Within Groups	77.041	184	.419		
	Total	88.921	190			
Situation 14	Between Groups	24.791	6	4.132	1.616	.145
	Within Groups	470.382	184	2.556		
	Total	495.173	190			
Situation 15	Between Groups	18.510	6	3.085	6.538	.000
	Within Groups	86.820	184	.472		
	Total	105.330	190			
Situation 16	Between Groups	27.282	6	4.547	2.915	.010

	Within Groups	287.011	184	1.560		
	Total	314.293	190			
Situation 17	Between Groups	.377	6	.063	.502	.806
	Within Groups	22.866	183	.125		
	Total	23.242	189			
Situation 18	Between Groups	13.305	6	2.217	2.021	.065
	Within Groups	201.879	184	1.097		
	Total	215.183	190			
Situation 19	Between Groups	10.326	6	1.721	4.264	.000
	Within Groups	74.271	184	.404		
	Total	84.597	190			

4.3.4. LEVEL OF AGGRESSION SHOWN BY THE RESPONDENTS OF DIFFERENT GENDER

Female drivers showed more aggression as compared to the male drivers as female drivers have shown 10.2 percent extreme aggression level as opposed to 6.4 percent of male drivers.

Table-8: Level of Aggressiveness Shown By the Respondents of Different Gender Groups

Gender	No Aggression	Somewhat Aggression	Aggression	Extreme Aggression
Male	55.7	24	13.8	6.4

Female	47.3	24.6	17.7	10.2

Table-9: Analysis Of Variance According To the Different Gender

Different Situations		Sum of Squares	df	Mean Square	F	Significance level
Situation 1	Between Groups	6.270	2	3.135	3.916	.022
	Within Groups	150.494	188	.801		
	Total	156.764	190			
Situation 2	Between Groups	1.732	2	.866	.645	**.526**
	Within Groups	250.842	187	1.341		
	Total	252.574	189			
Situation 3	Between Groups	.182	2	.091	.180	**.836**
	Within Groups	94.981	188	.505		
	Total	95.162	190			
Situation 4	Between Groups	2.923	2	1.461	2.501	.085
	Within Groups	109.873	188	.584		
	Total	112.79	190			

		6				
Situation 5	Between Groups	3.704	2	1.852	1.520	.221
	Within Groups	229.071	188	1.218		
	Total	232.775	190			
Situation 6	Between Groups	3.644	2	1.822	1.727	.181
	Within Groups	197.309	187	1.055		
	Total	200.953	189			
Situation 7	Between Groups	1.095	2	.548	1.169	.313
	Within Groups	87.584	187	.468		
	Total	88.679	189			
Situation 8	Between Groups	1.339	2	.669	1.790	.170
	Within Groups	70.284	188	.374		
	Total	71.623	190			
Situation 9	Between Groups	.372	2	.186	.488	**.615**
	Within Groups	71.618	188	.381		
	Total	71.990	190			
Situation 10	Between Groups	1.607	2	.803	.860	.425

	Within Groups	175.692	188	.935		
	Total	177.298	190			
Situation 11	Between Groups	.491	2	.246	1.090	.338
	Within Groups	42.388	188	.225		
	Total	42.880	190			
Situation 12	Between Groups	2.211	2	1.106	1.039	.356
	Within Groups	199.052	187	1.064		
	Total	201.263	189			
Situation 13	Between Groups	2.115	2	1.057	2.290	.104
	Within Groups	86.807	188	.462		
	Total	88.921	190			
Situation 14	Between Groups	.496	2	.248	.094	**.910**
	Within Groups	494.677	188	2.631		
	Total	495.173	190			
Situation 15	Between Groups	3.237	2	1.619	2.981	.053
	Within Groups	102.093	188	.543		

	Total	105.330	190			
Situation 16	Between Groups	5.460	2	2.730	1.662	.193
	Within Groups	308.833	188	1.643		
	Total	314.293	190			
Situation 17	Between Groups	.452	2	.226	1.854	.159
	Within Groups	22.790	187	.122		
	Total	23.242	189			
Situation 18	Between Groups	.779	2	.390	.342	**.711**
	Within Groups	214.404	188	1.140		
	Total	215.183	190			
Situation 19	Between Groups	1.378	2	.689	1.556	.214
	Within Groups	83.219	188	.443		
	Total	84.597	190			

As with most human behaviour, there is a stated and unstated, a conscious and unconscious motivation for most traffic disputes. Today aggressor could be male or female, young (usually), or old, educated or uneducated, rich or poor. Violent traffic disputes are rarely the result of a single incident but the cumulative result of a series of stressors.

4.3.5 LEVEL OF AGGRESSION SHOWN BY THE RESPONDENTS OF DIFFERENT DRIVING EXPERIENCES

Almost similar results have been observed in the data analysis according to driving experiences .Respondents of category one i.e. the drivers having driving experiences uoto 5 years have shown maximum aggression level while the other groups has almost same level of aggressiveness. This observation of research data proves that the novice drivers have maximum chances for involving in road rage incidences.

Table-10: Level of Aggressiveness Shown By the Respondents of Different Driving Experiences

Driving Experiences	No Aggression	Somewhat Aggression	Aggression	Extreme Aggression
Upto 5	48.1	24	17.9	10
5 to 10	58.2	23.5	13	5.3
10 to 15	61.3	23.7	10.9	4.1
15 to 20	63.1	20.5	10.7	5.7
Above 20	58.5	28.9	8.6	4

Table-11: Analysis Of Variance According To The Different Driving Experience

Different Situations		Sum of Squares	df	Mean Square	F	Sig.
Situation 1	Between Groups	10.709	5	2.142	2.713	.022
	Within Groups	146.056	185	.789		
	Total	156.764	190			
Situation 2	Between Groups	3.816	5	.763	.565	.727
	Within Groups	248.757	184	1.352		
	Total	252.57	189			

		4				
Situation 3	Between Groups	1.132	5	.226	.446	.816
	Within Groups	94.030	185	.508		
	Total	95.162	190			
Situation 4	Between Groups	6.149	5	1.230	2.133	.063
	Within Groups	106.647	185	.576		
	Total	112.796	190			
Situation 5	Between Groups	30.710	5	6.142	5.623	.000
	Within Groups	202.065	185	1.092		
	Total	232.775	190			
Situation 6	Between Groups	6.621	5	1.324	1.254	.286
	Within Groups	194.332	184	1.056		
	Total	200.953	189			
Situation 7	Between Groups	5.943	5	1.189	2.643	.025
	Within Groups	82.736	184	.450		
	Total	88.679	189			
Situation 8	Between	3.359	5	.672	1.821	.111

	Groups					
	Within Groups	68.264	185	.369		
	Total	71.623	190			
Situation 9	Between Groups	2.468	5	.494	1.313	.260
	Within Groups	69.522	185	.376		
	Total	71.990	190			
Situation 10	Between Groups	2.735	5	.547	.580	.715
	Within Groups	174.563	185	.944		
	Total	177.298	190			
Situation 11	Between Groups	2.129	5	.426	1.933	.091
	Within Groups	40.751	185	.220		
	Total	42.880	190			
Situation 12	Between Groups	9.880	5	1.976	1.900	.096
	Within Groups	191.383	184	1.040		
	Total	201.263	189			
Situation 13	Between Groups	6.180	5	1.236	2.764	.020
	Within Groups	82.741	185	.447		

	Total	88.921	190			
Situation 14	Between Groups	14.194	5	2.839	1.092	.366
	Within Groups	480.979	185	2.600		
	Total	495.173	190			
Situation 15	Between Groups	11.779	5	2.356	4.659	.000
	Within Groups	93.550	185	.506		
	Total	105.330	190			
Situation 16	Between Groups	19.048	5	3.810	2.387	.040
	Within Groups	295.245	185	1.596		
	Total	314.293	190			
Situation 17	Between Groups	.232	5	.046	.370	.868
	Within Groups	23.010	184	.125		
	Total	23.242	189			
Situation 18	Between Groups	3.470	5	.694	.606	.695
	Within Groups	211.714	185	1.144		
	Total	215.183	190			

Situation 19	Between Groups	5.076	5	1.015	2.362	.042
	Within Groups	79.520	185	.430		
	Total	84.597	190			

4.3.6 Level of Aggression Shown By the Respondents of Different Profession

Respondents of category one i.e. students have shown maximum aggression level while the other groups has almost same level of aggressiveness. This observation of research data shows that the drivers of having new driving experiences have maximum chances for involving in road rage incidences as compared to the other professional categories.

Table 12: Level of Aggressiveness Shown By the Respondents of Different Profession

Profession	No Aggression	Somewhat Aggression	Aggression	Extreme Aggression
Student	40.6	25.7	20.8	12.9
Engineer	50	23.6	18.4	8
Businessman	64.5	19.6	11.5	4.4
Serviceman	57.6	24.8	11.9	5.7
Housewife	42.1	21	31.5	5.4
Others	58.1	20.7	14.4	6.8

Table 13: Analysis Of Variance According To the Different Profession

Different Situations	Sum of Squares	df	Mean Square	F	Sig.

Situation 1	Between Groups	13.703	6	2.284	2.937	.009
	Within Groups	143.061	184	.778		
	Total	156.764	190			
Situation 2	Between Groups	15.553	6	2.592	2.001	.068
	Within Groups	237.021	183	1.295		
	Total	252.574	189			
Situation 3	Between Groups	6.255	6	1.042	2.157	.049
	Within Groups	88.908	184	.483		
	Total	95.162	190			
Situation 4	Between Groups	10.042	6	1.674	2.997	.008
	Within Groups	102.754	184	.558		
	Total	112.796	190			
Situation 5	Between Groups	18.136	6	3.023	2.591	.020
	Within Groups	214.639	184	1.167		
	Total	232.775	190			
Situation 6	Between Groups	28.998	6	4.833	5.143	.000

	Within Groups	171.955	183	.940		
	Total	200.953	189			
Situation 7	Between Groups	4.562	6	.760	1.654	.135
	Within Groups	84.117	183	.460		
	Total	88.679	189			
Situation 8	Between Groups	6.743	6	1.124	3.187	.005
	Within Groups	64.880	184	.353		
	Total	71.623	190			
Situation 9	Between Groups	8.995	6	1.499	4.379	.000
	Within Groups	62.994	184	.342		
	Total	71.990	190			
Situation 10	Between Groups	6.970	6	1.162	1.255	.280
	Within Groups	170.328	184	.926		
	Total	177.298	190			
Situation 11	Between Groups	4.866	6	.811	3.925	.001
	Within Groups	38.014	184	.207		
	Total	42.880	190			

Situation 12	Between Groups	25.874	6	4.312	4.499	.000
	Within Groups	175.389	183	.958		
	Total	201.263	189			
Situation 13	Between Groups	10.165	6	1.694	3.958	.001
	Within Groups	78.757	184	.428		
	Total	88.921	190			
Situation 14	Between Groups	23.306	6	3.884	1.515	.175
	Within Groups	471.867	184	2.564		
	Total	495.173	190			
Situation 15	Between Groups	10.080	6	1.680	3.245	.005
	Within Groups	95.250	184	.518		
	Total	105.330	190			
Situation 16	Between Groups	19.344	6	3.224	2.011	.066
	Within Groups	294.949	184	1.603		
	Total	314.293	190			
Situation 17	Between Groups	.505	6	.084	.677	.668

	Within Groups	22.737	183	.124		
	Total	23.242	189			
Situation 18	Between Groups	7.951	6	1.325	1.177	.321
	Within Groups	207.232	184	1.126		
	Total	215.183	190			
Situation 19	Between Groups	3.238	6	.540	1.221	.298
	Within Groups	81.358	184	.442		
	Total	84.597	190			

4.3.7 Level of Aggression Shown By the Respondents of Different Qualification

Overall, there was no significant difference up to .05 level in ANOVA has been found as drivers qualified up to post graduate levels were found showing maximum aggressive responses followed by drivers qualified up to primary and secondary levels.

Table 14: Level of Aggressiveness Shown By the Respondents of Different Qualification

Qualification	No Aggression	Somewhat Aggression	Aggression	Extreme Aggression
Primary	34.2	32.8	21.2	11.8
Secondary	31.5	31.7	26.3	10.5
Higher Secondary	68.4	19.5	9.4	2.7
Senior Secondary	58.2	23.5	12.5	5.8
Graduate	50.3	24.6	16.2	8.9

Post Graduate	40.6	25.6	16	17.8

5. CONCLUSION OF THE RESEARCH FINDINGS

Some common characteristics of all these road rage cases are

- It usually involves expressed aggression between strangers.
- It is related in some way to a driving incident.
- It involves a perceived threat of "invasion" into one's space, and thus, one's identity.
- It is a conflict phenomenon that has yet to secure a universally agreed upon definition.
- There are, by some standards, insufficient quantifiable data documenting its existence.
- Theories about its causes abound, proposing an extremely broad range of probabilities.
- The inability to target causes for the phenomenon presents major challenges to resolving it.

The table 15 reveals that somewhat aggressiveness was shown by the 35.1% respondents when driver of another vehicle came suddenly in front of the respondent's vehicle and the respondents had to put an emergency brake. Extreme aggressiveness was shown by 68.6% respondents when a fellow driver occupied their parking space in a fully congested parking lot. Somewhat aggressiveness had been shown by the 36.6% respondents towards those drivers who had the general tendency to play music at high volume while driving. About 39% respondents had shown aggressiveness towards those drivers who had the general tendency of frequently switching over lanes and preventing fellow drivers from passing efficiently. Respondents had shown aggressive attitudes towards risk taking pedestrians who runs across the road ,don't use zebra crossings and come in front of the busy traffic and bump with them, about 34% of the respondents had come across with such type of situation.

Some drivers have the bad habits of eating and drinking on the road side and throwing the waste paper, bottles and other things out of their windows while driving. 96.4% drivers had come across with such type of incidences where the waste paper, bottles etc. thrown out by the drivers whom they were following and these got struck on their windshields. Facing such situations 4.2% respondents responded extreme aggressively which led to following of the faulty driver's vehicle and fighting with him,

39.3% respondents gave bad gestures to the faulty drivers and shouted towards the faulty drivers.

Table 15: Analysis of Aggression Levels on Nineteen Different Situations

Behaviour	**S1***	**S2**	**S3**	**S4**	**S5**	**S6**	**S7**	**S8**	**S9**	**S10**
No aggressive behaviour	**47.1**	**55.5**	0	**68.6**	**70.7**	38.2	**81.7**	**89.5**	**78.5**	**56.5**
Somewhat aggressive behaviour	**35.1**	24.6	14.7	25.7	0	**36.6**	5.8	0	13.1	4.2
Aggressive behaviour	10.5	0	16.8	0	18.8	11	12.6	10.5	8.4	**39.3**
Extreme aggressive behaviour	7.3	19.9	**68.6**	5.8	10.5	14.1	0	0	0	0
Total	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**

Behaviour	**S11**	**S12**	**S13**	**S14**	**S15**	**S16**	**S17**	**S18**	**S19**
No aggressive behaviour	**66**	**52.3**	3.1	3.6	3.1	75.9	96.9	53.4	30.9
Somewhat aggressive behaviour	**34**	21.5	28.8	**52.9**	**67.5**	0	0	18.3	**53.4**
Aggressive behaviour	0	16.2	**57.1**	**39.3**	**16.8**	0	3.1	17.3	15.7
Extreme aggressive behaviour	0	9.9	11	4.2	**12.6**	**24.1**	0	11	0
Total	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**	**100**

***S1 to S19=situation 1 to situation 19**

Respondents had also found victimised by the fellow drivers like blocking their space, bad gestures etc. for which 46.6% respondents responded aggressively (varying from somewhat 18.3% to extreme aggressiveness 11%) towards the aggressors. Generally drivers in India driver at night with high beams which in case directly fall on the eyes of the drivers

produce glare effect and cause temporary impairment of vision due to the bleaching effect of Rods. About 69% respondents responded aggressively towards the drivers who were driving with high beam at night time.

6. CRRI CONTRIBUTIONS FOR THE MITIGATION OF ROAD RAGE

Research team participated in various activities to mitigate the road rage. Some of them as following:

THE MITIGATIONS MEASURES BY CRRI PLANNED ARE DIVIDED INTO FOLLOWING MAIN AREAS

The mitigations measures are broadly divided into following main areas:

1. EDUCATION AND ENFORCEMENT

a) Research team has planned to develop an educational film on ROAD RAGE to highlight the causes and ways to control road rage.

b) Working with the Enforcement people CRRI research team working as a coordinator to talk road rage victims, help in various research activities to find effective interventions of aggressive driving and road rage. Enforcement efforts have been accompanied by public information campaigns. CRRI Cooperative programs with Delhi police in various aspects were found to be effective. To understand the mechanisms underlying young drivers' risk-taking behaviour in CRRI participated in Road Safety and Anti Aggression campaign.. The goal such campaign was to bring about a change in the students and social climate so that normative behaviour of children is constructive. Various schools participated in the campaign.

c) CRRI participated in the First Aggression Management Workshop organized by the Delhi Police under chairmanship of Additional Commissioner of Police, Licensing Branch of Delhi Police on 15th and 17 th April, 2009 in which **CRRI participated as one of the coordinator of the core group along with the other highly expertise persons.**

d) In the workshop NAVCHENTA website www.navchetna.com was launched. The prior objective of launching such website was to inculcating safety attitude and non aggressive behaviour among youngsters through different processes e.g.

a) CRRI research team is interacting with the different experts for solving kids problems
b) CRRI research team is helping in research for identifying causes and mitigation of aggressive behaviour through this network.

2. BEHAVIOUR SCANNING AND MODIFICATION THROUGH AGGRESSION MANAGEMENT WORKSHOP

CRRI participated in aggression management workshop organized in Lady Irwin College by TrafficZam.com, website www.trafficzam.com for imparting aggression management practices on the road. CRRI highlighted various causes of road rage incidences and highlighted to avoid such conditions through safe and calm attitude. CRRI also provided practical simulation practices among the students to show the after effect of road rage and stress on human health.

This type of intervention is useful for those drivers who do not have any record of long time driving offences. Students and young drivers were taught to:

a) Control the Level of frustration and how to Avoid Becoming a Victim of road rage
b) Reducing Stress and Fatigue on the Road
c) Regular maintenance of the Car
d) Take journeys in easy stages
e) Knowledge about road signs and road rules
f) Knowledge regarding First Aid

3. STEPS TAKEN AND PLANNED FOR FURTHER MITIGATING ROAD RAGE

CRRI had also planned for a collaborative project work on indentifying aggressive attitude among college students riding two –wheelers with Dr Seema Melhotra, Associate Professor, Dept of Mental Health & Social Psychology, NIMHANS, Bangalore. This project is under review in CSIR.

NO- 5201/ addl cp/LWC

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Dt 18/2/2009

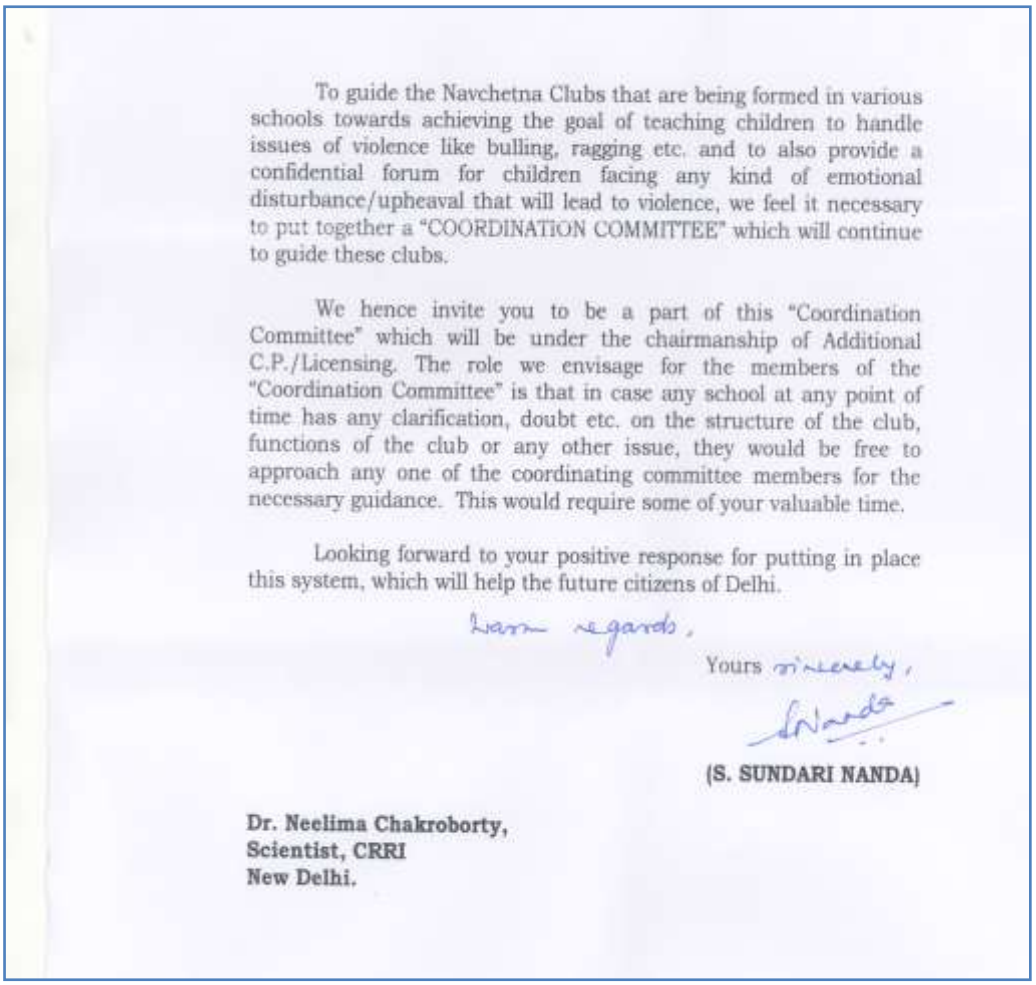
Dear Dr. Neelima,

Greetings from the Licensing Unit.

This is with reference to our interaction regarding the Anti-Gun Violence Campaign started by the Licensing Unit on the direction of Juvenile Justice Court.

The Hon'ble Court had sought compliance from Delhi Police in developing awareness by means of public awareness programmes, workshops etc. to help prevent the instances of crude display and use of weapons in public by our younger generation. Organizing educational programmes, workshops etc., is one of the most important means of creating awareness and effectively communicating the safety measures/preventive steps. Licensing Unit is making strenuous efforts in spreading awareness among the school children by organizing such educational programmes/campaigns. The goal is to bring about a change in the students and social climate so that normative behaviour of children is constructive. We have sensitized more than 500 School about the increasing incidents of teenage violence and addressed about 200 School Principals/representatives. We have also organized a "Slogan and Logo Competition" for the Anti Violence Campaign for which we received an excellent response from the schools all over Delhi. A "Student Council" was also constituted with 30 students from different schools of Delhi to judge these entries, which selected top three entries of students from Springdales and Bluebells schools. Stepping forward towards achieving the foremost aim of inculcating the sense of awareness and avoid futile violence among school children, Licensing Unit has taken the initiative of formation of "Navchetna Clubs" in different schools in Delhi.

We have received confirmation from about 60 schools about formation of "Navchetna Clubs" in their schools. As you would agree with me it is now important that we nurture these newly formed clubs and set them off in the right direction. I am confident that more and more schools will join in.



To guide the Navchetna Clubs that are being formed in various schools towards achieving the goal of teaching children to handle issues of violence like bulling, ragging etc. and to also provide a confidential forum for children facing any kind of emotional disturbance/upheaval that will lead to violence, we feel it necessary to put together a "COORDINATION COMMITTEE" which will continue to guide these clubs.

We hence invite you to be a part of this "Coordination Committee" which will be under the chairmanship of Additional C.P./Licensing. The role we envisage for the members of the "Coordination Committee" is that in case any school at any point of time has any clarification, doubt etc. on the structure of the club, functions of the club or any other issue, they would be free to approach any one of the coordinating committee members for the necessary guidance. This would require some of your valuable time.

Looking forward to your positive response for putting in place this system, which will help the future citizens of Delhi.

Warm regards,

Yours sincerely,

(S. SUNDARI NANDA)

Dr. Neelima Chakroborty,
Scientist, CRRI
New Delhi.

Letter from Additional Commissioner of Police, Licensing Branch of Delhi Police inviting CRRI for the participation in the Anti Road Rage and Anti Gun Violence Campaign

--- On Wed, 3/12/08, seema mehrotra <drmehrotra_seema@yahoo.com> wrote:

From: seema mehrotra <drmehrotra_seema@yahoo.com>

Subject: Re: your inquiry regarding Research for Aggressive Driving and Road Rage behaviour among two wheeler users

To: "Neelima Chakrabarty" <neelima.chakrabarty@gmail.com>

Cc: "manoj sharma" <mks712000@yahoo.co.in>

Date: Wednesday, 3 December, 2008, 8:46 AM

Dear Dr Neelima:

It was a pleasure to hear from you. My apologies for the delay in responding.

The proposal I mentioned has been developed by three of us in the department (namely myself, Dr Paulomi and Dr Manoj). It aims to examine aggressive driving in a student sample and an intervention component in the second phase.

1. Please let us know whether you would like to join us as co-investigator on this project. In that case, we could collect data at Bangalore and you could collect data in Delhi . Subsequently, we could collate the results.

2. Due to practical constraints, it is not feasible to come to Delhi , specifically for this purpose. We will also not be able to mobilize any funds for travel.

3. Regarding the project that you mentioned, we would be happy to join as co investigators at some point if you so desire and if it adds value in some way to the work you are already in the process of carrying out .

We look forward to the possibility of a fruitful and mutually satisfying collaboration,

Thanking you

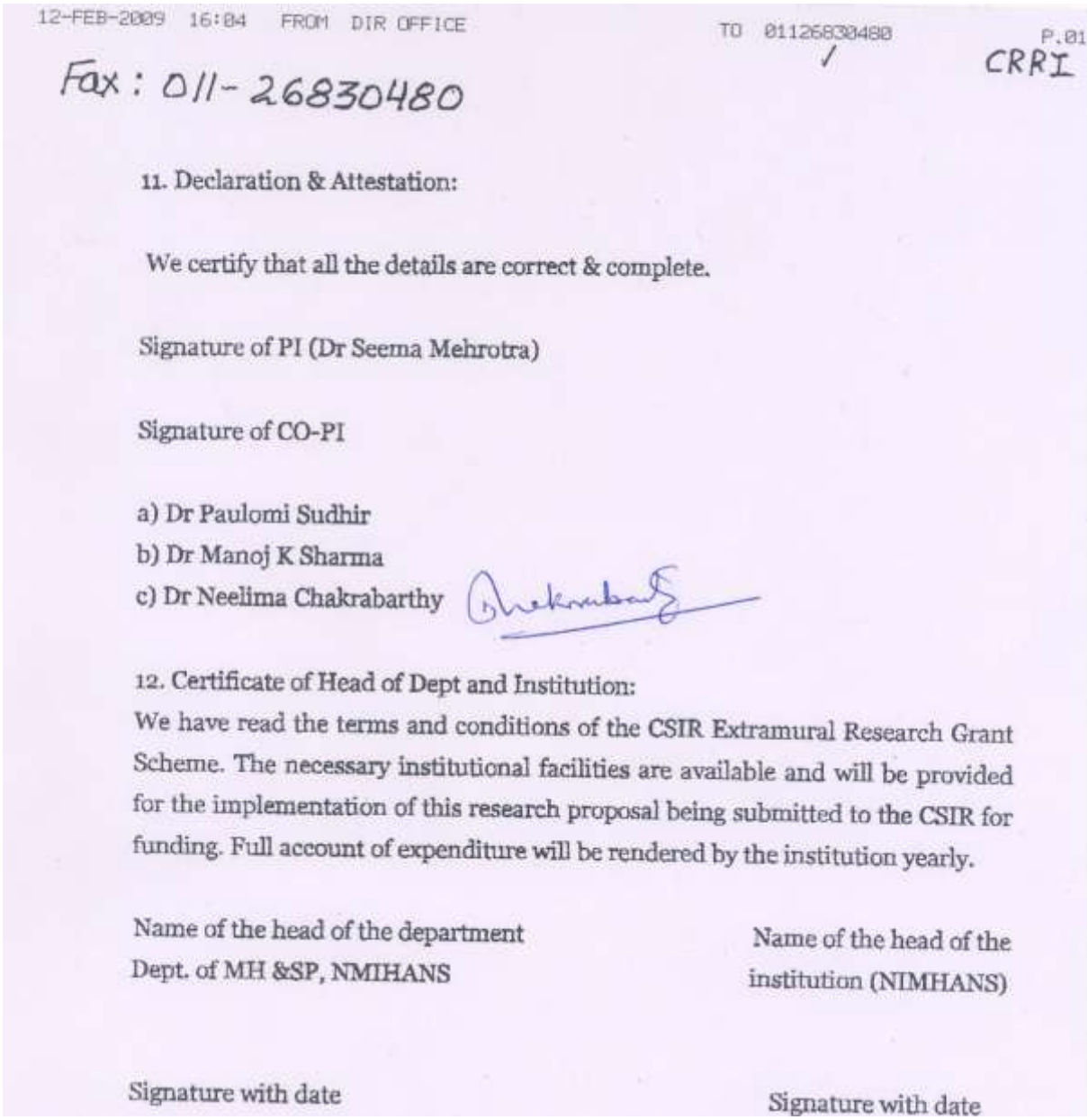
Sincerely

Dr Seema Mehrotra

Associate Professor

Dept of Mental Health & Social Psychology

NIMHANS, Bangalore



12-FEB-2009 16:04 FROM DIR OFFICE TO 01126830480 P.01

Fax : 011-26830480 CRRI

11. Declaration & Attestation:

We certify that all the details are correct & complete.

Signature of PI (Dr Seema Mehrotra)

Signature of CO-PI

a) Dr Paulomi Sudhir
b) Dr Manoj K Sharma
c) Dr Neelima Chakrabarthy

12. Certificate of Head of Dept and Institution:

We have read the terms and conditions of the CSIR Extramural Research Grant Scheme. The necessary institutional facilities are available and will be provided for the implementation of this research proposal being submitted to the CSIR for funding. Full account of expenditure will be rendered by the institution yearly.

Name of the head of the department
Dept. of MH &SP, NMIHANS

Signature with date

Name of the head of the institution (NIMHANS)

Signature with date

Fax and e-mail received from Dr.Seema Malhotra, Associate Professor, Dept of Mental Health & Social Psychology, NIMHANS, Bangalore

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