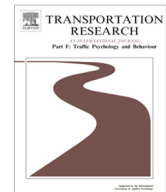




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Effect of drivers' risk perception and perception of driving tasks on road safety attitude

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ABSTRACT

The study explores the effect of drivers' risk perception and perception of driving tasks on road safety attitude. A sample of 1500 drivers, 500 each from three districts of Fatehabad, Gurgaon and Rohtak of Haryana in India has been used in the study. The primary data of 500 drivers of Fatehabad district was subjected to exploratory factor analysis which extracted eight factors from 39 items of the questionnaire. The factors were further subjected to confirmatory factor analysis on the data of 1000 drivers of Gurgaon and Rohtak districts for validating constructs of risk perception, perception of driving tasks, and road safety attitude encompassing five factors of traffic rules, aggressive behavior, non-driving activities/distraction, driving responsibility and carelessness. Structural equation modeling has been applied to find the effect of drivers' risk perception and perception of driving tasks on road safety attitude. The study has observed a significant positive correlation between drivers' risk perception and perception of driving tasks and found that both the perceptions significantly affect drivers' road safety attitude. Risk perception partially mediates the relationship.

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1. Introduction

Road accident is a global phenomenon and an important public health concern. Road accidents can result into death, economic/financial loss, and damage/injuries to the body parts leading to deformities, etc. The overall global road traffic fatality rate is 18 percent per 100,000 populations. There is a huge gap between traffic fatality rates of middle and high income countries. The annual road traffic fatality rates are 20.1 and 8.7 percent per 100,000 people in middle and high income countries respectively. Eighty percent of road traffic deaths occur in middle-income countries, which account for 72.2 percent of the world's population (Global status report of World Health Organization (WHO) on road safety, 2013). The vast gap in the accident scenario among the countries can be attributed to road infrastructure, traffic density on the roads, availability of public transport, behavioral and demographic factors, etc.

Road accidents have been increasing due to the extension of road network, increased vehicle fleet and burgeoning population of the country. Road network in India is over 4,865,394 km as on March 01, 2012. India has witnessed an increase of 54.3 percent in the incidence of accidental deaths during the decade of 2003 to 2013. There has been an increase of 1.8 percent in the number of road accidents from 443,001 in the year 2013 to 450,898 in 2014. In the year 2014, 481,805 traffic accidents have caused injuries to 481,739 persons and 169,107 deaths. The state of Haryana has also seen an increase of

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5.4 percent in the number of road accidents which have increased from 10,743 in the year 2013 to 11,043 in 2014. The number of injuries and deaths due to road accidents are 9958 and 4875 respectively in Haryana in the year 2014 ([National Crime Bureau Report, 2014](#)). This shows a dismal state of affairs of road accidents in India.

Road traffic accidents occur due to road conditions, road traffic, vehicle speed, climate and weather conditions, driving experience and driving behaviors ([Juhnke, Sullivan, & Harman, 1995](#)). Driving behavior is affected by road infrastructure, physical and social environment ([Stanton & Salmon, 2009](#); [Teye-Kwadjo, 2011](#)). Road characteristics, such as road width, the number of lanes, slopes, turns, curves, and road lights influence speed of vehicles ([Blatt & Furman, 1998](#); [Fildes, Rumbold, & Leening, 1991](#); [Warren, 1982, chap. 17](#)). Apart from road infrastructure and driving behavior, drivers inattentiveness and speed control while at the steering wheel, also affect the chances of occurrence of road accidents. Distraction and lack of attention by drivers have been associated to the increase in the number of road accidents ([Boufous et al., 2010](#)). Speed adjustment by drivers to suit road condition or hazard condition impacts road accidents ([Goldenbeld & Van Schagen, 2007](#)). The risk of road accidents can be reduced by regular maintenance of vehicle, training and education of safe driving ([The driver's Handbook, 2015](#)). The choice of travel mode depends upon infrastructure or availability of public transport, economics and psychological factors including perception of safety ([Daily & Martin, 1988](#)). Poor road conditions, lack of vehicle maintenance, and culture are the contributory factors in road accident deaths ([Silas & Adoga, 2011](#)). Drivers' health problem and low risk perception, distractions, traffic rules violations, road condition, and vehicle problems are the main factors behind the increase in the number road accidents ([Salthouse, 2005](#)). There are a number of factors which influence road accidents. No single study can incorporate all these factors. The present study explores the effect of behavioral factors on drivers' road safety attitude.

2. Theoretical framework

Drivers' road safety attitude and risk perception are two important behavioral issues in road accidents. An attitude comprising of affective, cognitive and behavioral components reflects individuals' evaluation of situation, events, people, etc. Road safety attitude is divided into two groups: general attitudes towards traffic safety, and special attitudes towards speed, drinking and driving, consideration for the other road users and responsibility. Drivers' attitude affects risk of road accident ([Assum, 1997](#)). There are a number of research studies ([Bamberg, Ajzen, & Schmidt, 2003](#); [Francis et al., 2004](#)) which have explored the relationship of attitude/behavior with risk perception of road accidents. Risk perception can modify human behavior. Perception of risk of road accidents by drivers can make them to adopt the behavior that helps in preventing road accidents. Human and behavioral factors affect road accidents ([Lawton, Parker, Manstead, & Stradling, 1997](#); [Sabey & Taylor, 1980](#)). Risk perception affects drivers' attitude regarding traffic rules, non-driving activities and driving responsibility ([Ram & Chand, 2015](#)). There are two set of theories explaining the effect of risk perception on attitude/behavior. Perceiving health risk as in case of smoking, HIV/AIDS, etc., individuals adopt positive/preventive behavior (Health Belief Model and precaution adoption process) whereas risk compensation theory advocates that individuals are likely to take more risk given the increased sense of security. Individuals' risk taking behavior also depends on the presence of safety features in vehicles ([Wilde, 1994](#)). The protection motivation theory (PMT) is found to be an effective method of convincing young drivers in controlling their speed ([Glendon & Walker, 2013](#)). The health belief model has applicability in planning road safety interventions ([Morowatisharifabad, 2009](#)).

Risk perception being a very common psychological phenomenon can affect road safety attitude directly as well indirectly. Apart from risk perception, road safety attitude is affected by a number of other factors. A large number of road traffic accidents are caused by the environmental stress factors and seriousness of accidents depends upon a number of factors, such as the age of the vehicle, safety measures, human error, and time and place of accident ([Ghaweel, Mursi, Jack, & Joel, 2009](#)). The concept of perception of driving task is closely linked to the field of road safety and behavior. Driving task is a very complex process as it involves the simultaneous control of lateral and longitudinal position through the use of vehicle control devices, together with pattern recognition and other higher level cognitive skills ([Science Serving Society](#)). In the last 30 years, the motor vehicle technology has undergone a remarkable evolution specifically in the context of the amount of electronic content in vehicles which has increased at rapid rate since the 1970s ([The Auto Industry Transformation](#)). The increased complexity of driving tasks on account of technological innovations in vehicles has substantially influenced longitudinal driving behaviors and traffic safety ([Hoogendoorn, Arem, & Hoogendoorn, 2012](#)). Visual-manual tasks deteriorate drivers' lateral performance whereas secondary tasks, such as mobile phone and navigation system decrease driving speed ([Knapper, Hagenzieker, & Brookhuis, 2015](#)). Safe driving behavior is an outcome of drivers' successful coping with the demands inherent in a driving task ([Fastenmeier & Gstalter, 2007](#)). Monotonous nature of driving task decreases the level of alertness ([Roge et al., 2004](#)). Driving task experience has a statistically significant effect on overall driving performance including car speed and overtaking ([Silva, Santos, & Meireles, 2014](#)). The present study is based on the premise that risk perception of road accidents and perception of driving task can help in modifying/improving drivers' attitude/behavior.

2.1. Risk perception

Risk perception is an inherent characteristic of human beings and animals. Perceiving risk in different conditions/situations is a personal phenomenon. An individual's level of risk perception varies and depends upon the past experiences, social

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