UNDERSTANDING THE BEHAVIOUR OF YOUNG DRIVERS IN RELATION TO TRAFFIC SAFETY ASPECTS IN LAHORE

M. A. Javid, and N. S. Faraz[*]

College of Engineering and Architecture, University of Nizwa, Nizwa, Oman,
[*]Department of Civil Engineering, National University of Computer and Emerging Sciences, Lahore, Pakistan
Corresponding author's email: ma.javid@hotmail.com

ABSTRACT: The impact of economic development in Lahore has resulted in increased motorized traffic, which in-turn has increased the chances of the roadside accidents. A questionnaire was designed consisting of personal attributes of the drivers, attitudinal and behavioral aspects of driving. Considering the feasibility and constraints, a total of 200 samples were obtained. The collected data showed that most of the young drivers had habit of looking outside right and left while driving. Most significant distraction factors include listening music, using mobile phone and watching at the rear view mirror, eating and smoking. The inside activities and outside attraction were the major factors of accidents. Using factor analysis technique, two factors including internal distraction elements and external distraction elements were explored. The results revealed that two extracted factors were significant determinants of drivers experiencing crash during driving. These findings implicate that the traffic safety policies should address distracted driving behavior of drivers in order to reduce traffic accidents and related social evils during driving.

INTRODUCTION

Pakistan is the world's 6th most populated country with an estimated population of almost 180 million (Population Reference Bureau, 2012). The fatality rate in Pakistan remains highest in the world at around 5565 fatalities per year (WHO, 2009). This figure is considered high in comparison to other countries, despite the fact that Pakistan is six times less motorized than United Kingdom (WHO, 2009). A time series analysis of available data from 1956 to 1996 shows a 14-fold increase in the total number of motorized vehicle crashes in Pakistan (Hyder *et al.,* 2006). However, the actual number may be much higher as in many cases, the accidents and concerned road trauma are not reported properly (Kayani *et al.,* 2014). However, accidents are estimated to be less than 1% of all motor vehicle crashes (Government of Pakistan, 2007).

Lahore is the heart of Pakistan as it is concentrated with various cultural, educational, medical, employment and entertainment facilities. According to the population census bureau report, it is the 2nd largest city of Pakistan and ranks fortieth in the world (World's Largest Cities, 2011). The vehicle ownership growth rate has reached to 17% per annum (JICA, 2012) and has resulted in huge motorized traffic on limited road infrastructure. There is serious traffic congestion on the roads despite construction of many underpasses, flyovers

and other improvements. According to the statistic of 2010, careless driving, over speeding and wrong turning has resulted in 332 deaths and 27,264 injuries in less than a year (Bashir, 2010). The National Injury Survey of Pakistan (NISP) shows that most injuries occurred to persons aged between 16 to 45 years (Ghaffar *et al.,* 2004), as the deaths are being increased, there is a sheer need to overcome this problem. Not only building of new roads, underpasses, flyovers, or making the strict law enforcement will reduce the deaths. There is also need to put intentions on the other factors, as good quality roads are more vulnerable to high speed, which may lead to accident. Despite of good transportation infrastruture, driver's behaviour can be critical in the occurance of traffic accidents. The true causes of accidents are not only from outside, most important are from the inside of vehicle. The critical behavior of drivers should be considered more, as improvement in the traffic facilities have contributed less in the reduction of accidents. Research is needed to be conducted at local level in order to develop the policies for the control of traffic accidents.

Only few studies provide the evidence of driver's behavior in relation to traffic safety aspects (Klair and Arfan, 2014 and Batool *et al.,* 2012). The main aim of study is to collect relevant data with the help of a quesitonnaire survey for the identification of significant factors that contribute towards high accident rate and propose some policy measures to improve traffic safety.

MATERIALS AN METHODS

The findings of this study were based on the results of a questionnaire survey that was conducted in Lahore city. A detailed questionnaire was designed consisting of potential drivers distraction factors and conducted at suitable locations. The collected data was analyzed using conventional and statistical technique.

Questionnaire Design: To collect the required data a comprehensive questionnaire was designed in order to identify the factors resulting driver's distraction during driving. The first section was based on the demographic features of drivers e.g. age, gender, driving experience and possession of driving license etc. Second section of questionnaire included many statements on internal and external distraction elements of driving and was evaluated using a five point Likert scale i.e. never, sometimes, often, very often, and always (Table 1). The main hypothesis behind selection of these items included local traffic safety problems, frequency of occurrence, potential factors resulting distraction, respondents easiness in answering and role in the development of safer transportation policies.

Table 1: Questionnaire items.

Description	Scale
Personal and driving information as presented in Table 2	
Statements on various activities during driving	
a) Do you perform other activities while driving?	Five point scale was
b) Do you wear a seat belt while driving?	used:
c) Do you believe that doing simultaneous activities while driving is not an issue for you?	Never, sometimes,
d) Do you enjoy music while driving?	often, very often, and
e) Do you smoke in your vehicle while driving?	always
f) Do you interact with others while driving?	
g) Do you answer the phone call while driving?	
h) Do you adjust the tape recorder or mp3 while driving?	
i) Do you eat while driving?	
j) Do you watch videos while driving?	
k) Do you keep your eye at rare view mirror?	
l) Do you text while driving?	
m) Do you apply makeup or adjust your hair style while driving?	
n) Do you drink while driving?	
o) Did you receive any fine for using the mobile phone?	
p) Do you look at the activities going outside?	
q) Do you enjoy outside sceneries while driving?	
r) Do you look at different advertisement boards outside?	
s) Do you get annoyed when some animal comes in front of vehicle?	
t) Ever bright light of front vehicle distracts you?	
u) Do you listen to the people asking for the lift?	
v) Have you ever experienced crash while driving?	

Survey and Sampling: The survey was conducted at Lahore campus of National University of Computer and Emerging Sciences. The location was selected seeking the feasibility of conducting the survey and target group of driver's population. The main reasons behind choosing the study area included the followings: (i) most of the students and employees used their private vehicle for travelling to university, (ii) as the university consisted of mostly young and enthusiastic students, who were more subjected to perform the distracted driving like listening music, makeup, adjusting hair style, or talking to a friend, were normally actions which they perform on daily basis, (iii) respondents were easily accessible and (iv) it saved time and traveling cost.

Random sampling technique was used to choose the respondents at the selection location. Respondents were selected or approached randomly at the University and request was made for survey. Selected respondents were introduced regarding objectives and contents of the questionnaire. Respondents were instructed for different evaluation scales used in the questionnaire to measure response measurement. To assure the reliability of the data, all the questionnaires were filled by interviewing the respondents. A very low response rate was observed and due to this, only 200 usable samples were obtained.

Statistical Model Specifications: The surveyed data was analyzed using frequency distribution and structural equation modeling (SEM) techniques. Structural equation modeling (SEM) is a multi-variant statistical tool that has widely been used in transportation research studies (Javid *et al.,* 2016; Javid *et al.,* 2015a, b and Warner and Aberg, 2006). This technique has several advantages over

conventional regression analysis. Using SEM it was possible to link observed variables with observed latent variables. This technique allowed including maximum possible observed variables in the model and interpreting them under the stated hypothesis. It is possible to explore direct and indirect effect of observed variables on objective variables. In this paper, exploratory factor analysis was conducted and two factors were extracted from observed data on possible driver's distraction factors. These factors were used to construct the structure of driver's crash experience.

RESULTS AND DISCUSSION

Distribution of Personal and Trip Attributes: Distribution of respondent's socio-economic characteristics was calculated (Table- 2). Most of the respondents were males and almost 73% aged between 21-30 years. It was due to high share of students in the sample size as most of them were young. Almost half of the respondent had car and 48% had motorcycles for movement. The respondents from FAST University belonged to rich families and had cars or motorbikes. Most of them had self-driven drive car or motorcycle (Table- 2). It was noticed that mostly people in the university did not have the proper training of driving or even had no driving license. It showed that nearly half of the respondents did not know how to drive properly and effectively. Results showed that most of them usually drive for one to two hours, which was usually from home to university and back. Most of the students had learnt the driving from family members or friends. The most important factor in this context was the lack of awareness among people. The people just considered it to be ample to learn the driving from family members.

Table 2: Distribution of personal and driving characteristics.

Characteristic	Distribution (%)
Gender	Male (74), Female (26)
Age (years)	Less than 20 (18), 20-30 (73), more than 30 (9)
Occupation	Student (80), worker (11), entrepreneur (7), others (2)
Vehicle ownership	Car (50), motorcycle (48), None (2)
Driving experience (years)	1-2 (26), 3-4 (31), 5-6 (14), more than 6 (29)
Daily driving frequency	15-30 min (24), 31-60 min (35), 1-2 hours (26), 3-4 hours (11), more than 4 hours (4)
Way of learning driving	From friends (37), from family member (56), from driving school (7)
Possession of driving license	Yes (58), No (42)

Distribution of Response on Internal and External Distraction Factors: The distribution of respondent's response on activities was performed by the drivers during driving (Fig. 1). The major activities that drivers performed during driving were listening to music, answering phone call, adjusting tape recorder or mp3, keeping eye at the rear mirror, looking at outside activities and scenic views. As most of the drivers were young, and were supposed to be keen for listening music and seeing outside activities and landscape features. In a stud, Regan *et al.* (2005) reported some different driving distraction factors which included: immovable objects, insect in vehicle, reading, applying makeup, dialing hand held service, inserting CD, eating, talking with others, drinking, adjusting the radio and child at the rear seat. Other researchers reported that the use of mobile phone while driving could have significant impact on driving behavior (Yannis, 2010 and Charlotte *et al.,* 2010). Study results revealed that majority of the drivers never used seat belts or helmets while driving and most of them did not smoke while driving. Students during travelling for educational or recreational trips did not want to miss any beautiful scene while driving. Different add companies think to be more impressive when they placed attractive and captive ads on the highway or motorway. Most of the drivers were distracted and annoyed when some animal come in front of them on road. While surveying, maximum respondents responded positively who always were distracted when a bright light came in front of them. Many respondents did not get distracted by giving lift to others but said that it was rather a social issue. More than half of the respondents said that they had never experienced the crash or any accident while driving.

Factor Analysis on Respondent's Response: An exploratory factor analysis was conducted on distraction factors using stated response of drivers. Two factors were extracted and were named while considering the associated tendency with observed variables from driver's perspective. These were 'internal distraction elements', and 'external distraction elements'. A cut-off value of 0.4 for factor loading was used for extraction purpose (Table 3). Results of factor loadings and Cronbach's alpha showed that there was significant internal consistency in evaluating the internal and external distraction elements for both extracted factors.
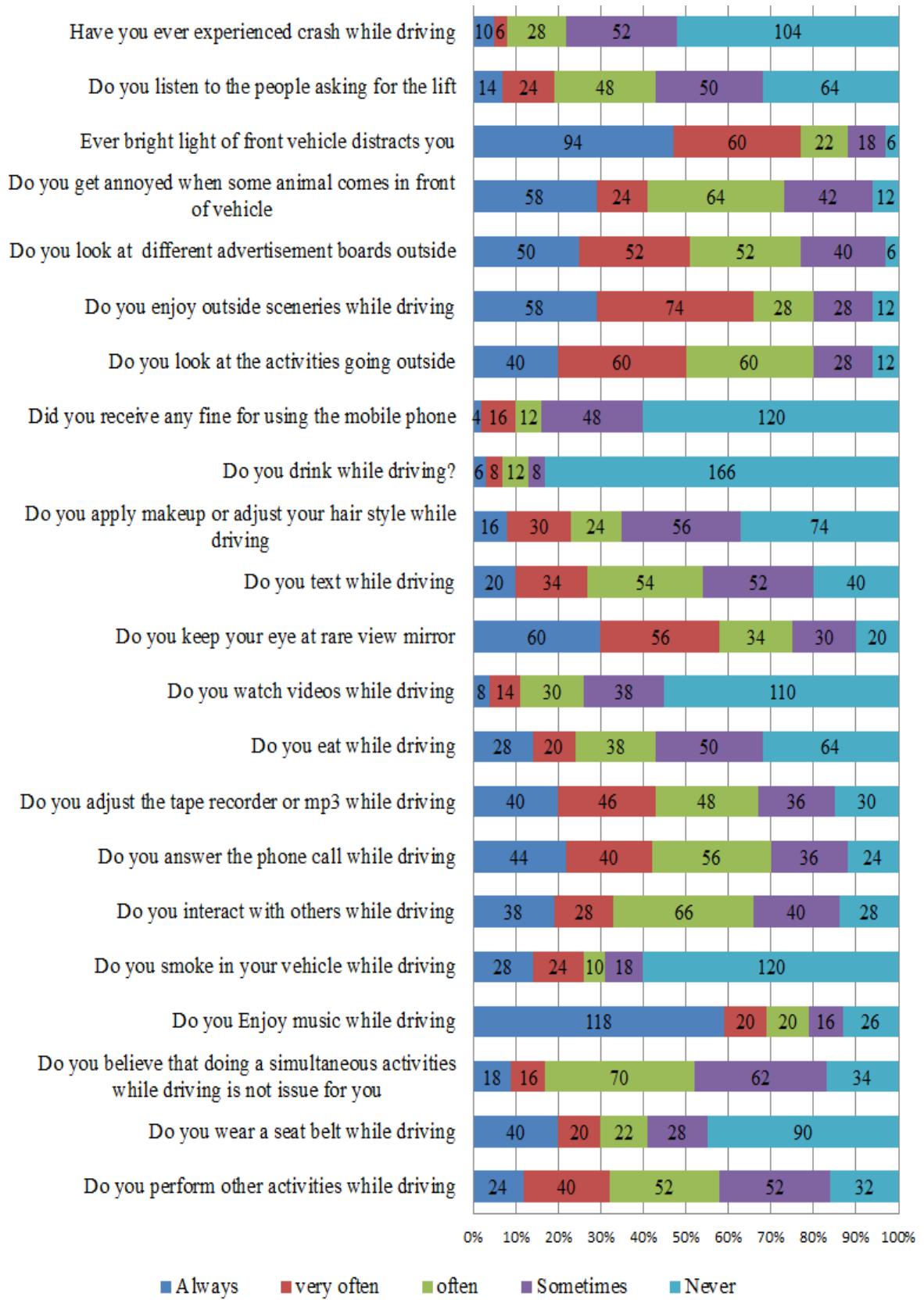
Figure 1: Distribution of response on various internal and external distraction factors

Table 3: Rotated factor loading for extracted factors.

Observed Variables	Internal Distraction Elements	External Distraction Elements
Do you answer phone call while driving	0.792	
Do you adjust tape recorder or MP3 while driving	0.753	
Do you eat while driving	0.714	
Do you perform other activities while driving	0.706	
Do you text while driving	0.643	
Do you interact with others while driving	0.608	
Do you enjoy music while in the vehicle	0.471	
Do you apply makeup or adjust your hairstyle while driving	0.427	
Do you watch at the different advertisement boards outside		0.800
Do you enjoy outside sceneries while driving		0.789
Do you look at activities going outside		0.776
Ever bright light of front vehicle distracts you		0.437
Cronbach's Alpha value	0.831	0.773

Structural Equation Modeling: A structural model was developed for drivers experiencing crash or accident while driving with the help of factor analysis results. The developed structural model (Fig. 2) depicted that internal and external distraction factors were significant determinants of drivers experiencing crash during driving. Hence, these factors needed to be modified or addressed for the control of traffic accidents in the city. The positive structural relationships between the two latent variables and endogenous observed variables of 'have you ever experienced crash while driving?' showed that drivers who distracted more due to internal and external elements experienced more accidents while driving. Yannis (2010) also reported almost similar results that young aged groups were distracted at the time of the crashes and seemed to be involved in accidents more. To reduce accidents, it was required to change driving behavior either by changing the attitudes using some awareness and educational programs or by imposing some heavy fines. The values of goodness of fit parameters (Fig. 2) indicated that this model had good fit in predicting the driver's behavior.

Chi-sq. /DF = 1.857, GFI = .821
CFI = 0.769, RMSEA = 0.095
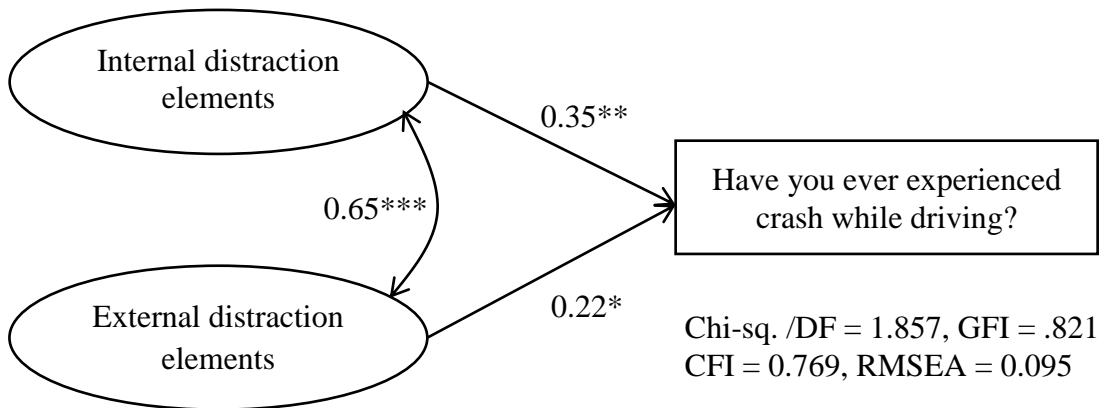
Figure 2: Structural model of driver's crash experience
([***] significant at 1%, [**] significant at 5%, and [*] significant at 10%)

Conclusions: The results revealed that most of the young drivers were involved in-vehicle and outside activities during driving which resulted in distracted driving behavior. It was concluded from SEM results that internal and external distraction elements were significant determinants of young drivers experiencing traffic accidents on roads. The study findings implied that driving without driving license and improper driving training could be a major factor of high road accidents and related fatalities. These significant and important factors needed to be addressed for the improvement of traffic safety situation in Lahore city.

REFERENCES

Bashir, S. (2010). 332 killed, 27,000 injured in 26,155 accidents in 10 months. The News, 26 December. Available: http://www. thenews. com.pk/.

Batool, Z., O. Carsten, and A. Jopson (2012). Road safety issues in Pakistan: a case of Lahore. Transport. Plan. Tech. 35(1): 31-48.

Charlotte L., K.L Young, and Michael. 2010. The use of mobile phones while driving. Human factors and simulation group, Monish university accident research center.

Ghaffar, A., A.A. Hyder, and T.I. Masud (2004). The burden of road traffic injuries in developing countries: The 1st National Injury Survey of Pakistan. Public Health. 118:211–217.

Government of Pakistan, Road safety in Pakistan. Islamabad: National Road Safety Secretariat, Ministry of Communication, 2007.

Javid, M.A., T. Okamura and F. Nakamura (2015a). Evaluation of Public Satisfaction with Service Quality of Daewoo Urban Bus Service in Lahore, Pakistan. J. Eastern Asia Soc. Transport Stud. 11:1097-1108.

Javid, M.A., T. Okamura, F. Nakamura, S. Tanaka and R. Wang (2015b). Factors Influencing the Acceptability of Travel Demand Management (TDM) Policies in Lahore: Application of Behavioral Theories. Asian Transport Stud. 3(4):447-466, 2015b.

Javid, M.A., T. Okamura, F. Nakamura, S. Tanaka and R. Wang (2016). People's Behavioral Intentions towards Public Transport in Lahore: Role of Situational Constraints, Mobility Restrictions and Incentives. KSCE J. Civ. Eng. 20(1): 401-410.

JICA. 2012. Lahore Urban Transport Master Plan in the Islamic Republic of Pakistan, Final Report Volume I&II, March, 2012. Retrieved from JICA online library website: http://libopac.jica.go.jp

Kayani, A., J.J. Fleiter, and M.J. King (2014). Underreporting of road crashes in Pakistan and the role of fate. Traffic Inj. Prev. 15(1):34-39.

Klair, A.A. and M. Arfan (2014). Use of seat belt and enforcement of seat belt laws in Pakistan. . Traffic Inj. Prev. 15(7): 706-710.

Population Reference Bureau. World population data sheet, 2012.

Regan, M.A., K.L. Young, and I.J. Johnston 2005. Monash University Accident Research Centre Submission to the Parliamentary Road Safety Committee: Inquiry into Driver Distraction. Monash University Accident Research Centre, Clayton, Victoria.

Warner H.W. and L. Aberg (2006). Drivers' decision to speed: A study inspired by the theory of planned behavior. Transport. Res. F-Traf. 9:427-433.

World Health Organization (WHO). World health statistic. 2009.

World's Largest Cities, 2011. World's largest cities. Available at: http://www.mongabay.com/cities_pop_01.htm

Yannis, G. (2004). Review of distracted driving factors. Transportation. 6-10.