

Mobile phone use while driving: a major public health problem in an Arabian society, State of Qatar—mobile phone use and the risk of motor vehicle crashes

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Abstract

Aim The aim of the present study was to assess the rate of mobile phone use among drivers who were involved in road traffic crashes and to determine the factors associated with mobile phone use in Qatar.

Methods Structured interviews were conducted and participants were asked to complete a questionnaire concerning socio-demographics, driving attitudes and behaviour,

adherence to traffic laws and mobile phone use. The study was conducted from December 2004 to June 2005 during which 1,139 drivers were asked to participate in the study and 822 drivers expressed their consent and met the inclusion criteria with a response rate of 72%.

Results There was a high rate of mobile phone use among individuals associated with crashes (73.2%). Of 602 drivers, 497 (82.6%) used handheld mobile phones without any extra add-on equipment. A stepwise logistic regression analysis showed that the vehicle type (four-wheel drive vs small car), excessive speeding, educational level and running a red light were statistically significant factors associated with mobile phone use among drivers who were involved in road traffic crashes.

Conclusion Use of mobile phones while driving in Qatar is very high and poses a high risk for violations and motor vehicle crashes. These conclusions are discussed with reference to current interventions and safety regulations that are being launched.

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Introduction

There is increasing evidence that the use of a mobile telephone while driving a motor vehicle increases the risk of road crashes (Bener et al. 2006a, b; Hancock et al. 2003; Lamble et al. 1999; Lamble et al. 2002; Redelmeier and Tibshirani 1997; Sagberg 2001; Violanti and Marshall 1996; Violanti 1998). The risk of collision while driving using a mobile phone including hands-free phones has been, for instance, reported to undergo a fourfold increase (Redelmeier and Tibshirani 1997), though a ninefold

increase was noted in one case-control study comparing users and non-users of mobile phones while driving (Violanti 1998). These studies did not however specifically report how mobile phone use interferes with driving and causes the increased crash risk.

There is however a large body of research that has identified a number of behaviours and measures that are negatively influenced by the use of a mobile telephone while driving. These include a loss of lane maintenance (Briem and Hedman 1995; Reed and Green 1999), difficulties in making gap judgments (Brown et al. 1969), a failure to process all road-relevant cues (Haigney and Westerman 2001) and a reduction in headway (Lamble et al. 1999). The most critical task which mobile phone use while driving may impair is the ability to detect hazards and to react to them in time. For instance, simulator studies have shown that a driver's reaction time to the onset of a lead car's brake lights becomes longer when using a mobile phone, especially among elderly drivers (Alm and Nilsson 1995). The greatest concern is that drivers engaged in an intensive conversation on a mobile phone can completely fail to respond to brake lights of a car in front or to respond to a traffic light turning red (Hancock et al. 2003; Irwin et al. 2000; Lambale et al. 1999; Strayer et al. 2003). For example, Hancock et al. (2003) found that use of an in-vehicle communication system delayed reactions by 15% in a crucial stop light task, forcing drivers to brake later and harder to stop in time.

Different aspects of mobile phone use can influence driving performance. For instance, US crash reports have shown that the majority of mobile phone-related crashes occurred during conversation (National Highway Transportation Safety Administration 1997). Many researchers believe that the distraction caused by the conversation is the primary source of distraction whereas the physical task demand of mobile phone use (e.g. answering a call, dialling a number, holding a handheld mobile phone) is only a secondary source of distraction and possibly not related to accidents (Crundall et al. 2005; Violanti and Marshall 1996). Other physical distractions such as lighting a cigarette and smoking have little or no relationship to accidents (Violanti and Marshall 1996).

Like every risky or illegal behaviour, risky mobile phone use can be assumed to be related to driver characteristics. Some driver groups are simply more prone to risky behaviour than others (e.g. young male drivers vs middle-aged female drivers). In addition, the same risky way of using a mobile phone while driving can cause a different level of risk among different driver groups (e.g. hazard detection and reaction times of elderly drivers might show higher decrease than that of young drivers). Earlier studies show that different socio-demographic and psychological factors influence the degree to which misuse of mobile

telephones increases risks in traffic. Lam (2002) showed that age influences the relationship between in-vehicle distraction and the risk of car crash injury with younger drivers more prone to distraction, especially among 24- to 29-year-old drivers. Males have also been found to have a significantly higher accident involvement rate than females regarding the use of mobile telephones (Violanti 1997). More recently, Pöysti et al. (2005) found that the increase in phone-related hazards is also related to higher mileage, more extensive phone use, younger age, leading occupational position and low safety motivation.

Unfortunately the vast majority of these studies have focused on mobile telephone use in Western industrialized countries. Other countries, such as those Arabian states which have developed rapidly over the last 50 years, are under-represented in the research literature (Bener and Crundall 2005), and the cultural aspects and differences in mobile phone use while driving have remained totally unexamined. The cultural aspects of driver behaviour in general and mobile phone use in particular are of the greatest importance because previous studies (Özkan et al. 2006) and international accident statistics have shown considerable regional differences in both accident distribution and risky driving. Especially a mobile phone conversation as a means of communication should reflect cultural and social norms. Therefore, it can be assumed that the amount and ways of using a mobile phone while driving are different in Arabian countries from patterns in Western Europe and the USA. For example, rules related to politeness and respect may prevent drivers from ignoring a phone call or from cutting the conversation short when a driving situation becomes difficult. It is especially important to address these issues in Middle Eastern countries because road traffic deaths are on the increase in some Arabian countries such as Qatar, and traffic injuries and fatalities involve mostly young drivers (Bener 2005). At the same time, a Qatari Government report has demonstrated a fivefold increase in mobile telephone use in the State of Qatar. The number of mobile telephone units in circulation was considerably high in 2005 (532,141) compared to the year 2000 (119,460) (Ministry of Planning 2005). The aim of the present study is to assess the extent of the problem of mobile telephone use while driving in the state of Qatar and to identify factors related to it.

Subjects and methods

A cross-sectional survey was performed in the State of Qatar during the period from December 2004 to June 2005. The participants aged 18 years and above were selected among Qatari national drivers who were involved in motor vehicle collisions resulting in personal injury. The sample

was selected on the basis of having had a traffic crash while driving and the data were analysed to find the frequency of drivers using a mobile telephone among drivers who were involved in road traffic crashes. Traffic crash means that accidents occurred with moving vehicles. Those drivers who were involved in fatal crashes were not counted in this study. This pool of injury accidents was chosen because of two reasons. First, injury-related accidents are more reliably recorded than minor accidents leading only to material damages and the sample is less biased to certain types of accidents and driver groups. Material damage accidents are often settled on the spot whereas injuries almost always require hospitalisation and, thus, are reported to the police. Second, inclusion of all injury traffic accidents provided us a more extensive and reliable database than pre-sampling based on mobile phone use or driver status, which often is either forgotten or misreported in hospital records. The survey was conducted at the 12 Primary Health Care Centres (PHCC), which represent over 75% of total visits per year. The sampling procedure is demonstrated in Fig. 1.

A total of 1,139 drivers involved in road traffic accidents were asked to participate in the study and 822 drivers expressed their consent to participate in this study and met the inclusion criteria with a response rate of 72%. Three hundred and seventeen participants were excluded from the study because they declined to participate in this study or they did not complete the questionnaire and had unstable medical or social problems at the time. All participants had driving licenses and were assured of anonymity and confidentiality.

Qualified nurses and health educators were instructed to structurally interview and complete a questionnaire for

randomly selected Qatari men and women drivers. Participants were asked to indicate their age, gender, marital status, educational level, occupation, place of living, housing conditions, driving experience, type of car [four-wheel drive (4WD) or small car], frequency of seat belt use, reasons for not wearing a seat belt, speed choice on different roads, annual mileage, history of traffic offences, history of accidents and the frequency of mobile phone use using questions like “Do you use a mobile phone while driving?”, “If yes, what is the average duration of use?”

The analysis was based on the 822 Qatari drivers (232 women and 590 men) aged 18 years and above who had a driving license (mean age of drivers was 33.7±10.2 years).

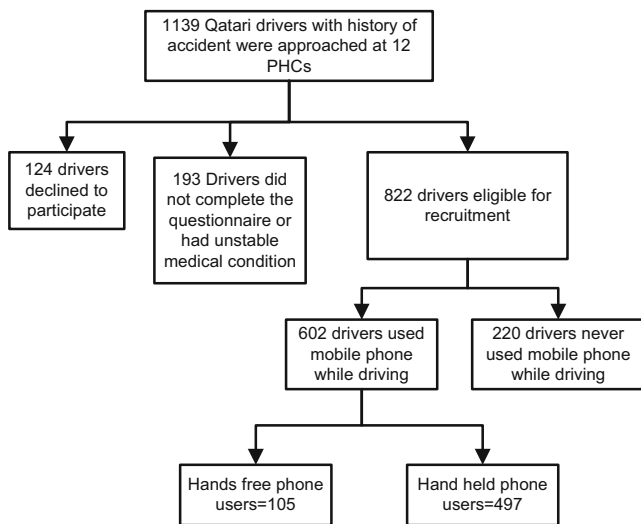
The data were coded and entered into a computer and processed on an IBM-PC compatible computer using the Statistical Packages for Social Sciences (SPSS), Windows version No. 15, Norusis (1998). Chi-square analysis was performed to test for differences in proportions of categorical variables between two or more groups. In 2×2 tables, Fisher’s exact test (two-tailed) replaced the chi-square test if the assumptions underlying chi-square were violated. Logistic regression analysis was used to predict the risk factors for road traffic casualties among mobile phone users while driving. The level $p < 0.05$ was considered as the cut-off value for statistical significance.

Results

Table 1 shows the socio-demographic characteristics of the drivers studied by use and non-use of a mobile phone while driving. The frequency of drivers using a mobile phone while driving was very high at 602 (73.2%). The average number of incoming or outgoing calls of drivers during driving was 4.28 per day. There were no significant differences between age groups in mobile phone use frequency while driving. The female to male ratio of the drivers was 1:2.8. The frequency of drivers using a mobile phone while driving was significantly higher among less educated, manual labourers and army and police employees living in semi-urban areas, driving a 4WD and having had a driving experience of more than 5 years ($p < 0.001$).

Table 2 shows some important behaviours and habits of mobile phone using drivers and non-mobile phone using drivers. Drivers who used mobile phones while driving were less likely to wear a seat belt (49.9% used a seat belt on most of the trips) than drivers who did not use a phone while driving (57.7% used a seat belt on most of the trips) ($p = 0.033$). In addition, red light violations were more common among the group who reported using a mobile phone while driving ($p < 0.001$).

Table 3 shows the results of stepwise logistic regression analysis of road traffic crashes related to mobile phone use



The estimated population of State of Qatar in year 2004 was 755,163
 The total number of registered mobile phone in year 2004: 532,141.
 The proportion of people who have access to mobile phone in year 2004 was 70.5%.

Fig. 1 Sampling procedure for the recruitment of drivers

Table 1 Socio-demographic characteristics of the drivers studied by use and non-use of a mobile phone while driving

Variables	Mobile phone user (<i>n</i> =602)	Non-mobile phone user (<i>n</i> =220)	<i>p</i> value significance
	<i>n</i> (%)	<i>n</i> (%)	
Age group			
<24	320 (53.2)	123 (55.9)	NS
25–34	164 (27.2)	64 (29.1)	
35–44	90 (15.0)	25 (11.4)	
≥45	28 (4.7)	8 (3.6)	
Sex			
Male	443 (73.6)	147 (66.8)	0.056
Female	159 (26.4)	73 (33.2)	
Marital status			
Currently single	99 (16.4)	45 (20.5)	NS
Currently married	503 (83.6)	175 (79.5)	
Education			
Illiterate	123 (20.4)	24 (10.9)	<0.001
Primary	184 (30.6)	67 (30.5)	
Intermediate	81 (13.5)	31 (14.1)	
Secondary	183 (30.4)	67 (30.5)	
University	31 (5.1)	31 (14.1)	
Occupation			
Not working	65 (10.8)	38 (17.3)	<0.001
Sedentary/professional	182 (30.2)	102 (46.4)	
Manual	172 (28.6)	26 (11.8)	
Housewife	75 (12.5)	38 (17.3)	
Army/police	108 (17.9)	16 (7.3)	
Place of living			
Urban	421 (69.9)	171 (77.7)	0.028
Semi-urban	181 (30.1)	49 (22.3)	
Vehicle type owned			
4WD	271 (45.0)	56 (25.5)	<0.001
Small car	331 (55.0)	164 (74.5)	
Driving experience			
<5	246 (40.9)	117 (53.2)	0.001
5–10	150 (24.9)	32 (14.5)	
>10	206 (34.2)	71 (32.3)	
Annual mileage			
<20,000 km/year	291 (48.3)	109 (49.5)	NS
20,000–30,000 km/year	222 (36.9)	73 (33.2)	
>30,000 km/year	89 (14.8)	38 (17.3)	

while driving. The vehicle type (4WD vs small car), excessive speeding, educational level and running a red light were factors statistically significantly associated with mobile phone use among drivers who were involved in road traffic crashes.

Discussion

Mobile phone use in motor vehicles is increasing rapidly worldwide. Our study showed a very high frequency of mobile phone use while driving (73.2%) in a large sample

of Qatari drivers. Over the last several years, the impact of mobile communication technology on traffic safety has been a major target of interest (Hancock et al. 2003; Lambie et al. 1999; Pöysti et al. 2005; Redelmeier and Tibshirani 1997; Sagberg 2001; Violanti 1997, 1998). Several studies (Bener et al. 2008a, b) have indicated impairments in driving performance due to the mobile or mobile phone use. The use of mobile telephones in motor vehicles is associated with a quadrupling of the risk of a collision during the brief period of a call. Meanwhile, it should be noted without any doubt that mobile phones have some benefits, such as allowing drivers to make emergency

Table 2 Some important behaviours and habits of mobile phone using drivers and non-mobile phone using drivers

Variables	Mobile phone user (n=602)	Non-mobile phone user (n=220)	p value significance
	n (%)	n (%)	
Use of seat belt			
Never	222 (36.9)	79 (35.9)	0.033
Less than half of the trips	80 (13.3)	14 (6.4)	
More than half of the trips	275 (45.7)	117 (53.2)	
Always	25 (4.2)	10 (4.5)	
History of violation			
Speeding	290 (48.2)	81 (36.8)	0.004
Running a red light	273 (45.3)	54 (24.5)	<0.001
Smoking habits			
Yes	169 (28.1)	66 (30.0)	NS
No	433 (71.9)	154 (70.0)	
Smoking while driving (smokers only)			
Never	18 (10.7)	8 (12.1)	NS
Seldom	32 (18.9)	14 (21.2)	
Sometimes	50 (29.6)	18 (27.3)	
Often	69 (40.8)	26 (39.4)	
Use of CD/cassette player while driving			
Yes	275 (45.7)	119 (54.1)	0.033
No	327 (54.3)	101 (45.9)	

calls under certain circumstances like reporting a traffic accident or a dangerous road condition (Chapman and Schofield 1998).

Our study did not show any significant difference in mobile phone use according to age in contrast to the report by Taylor et al. (2003), which showed a higher mobile phone use while driving among middle-aged and young drivers. Male drivers with mobile phones had a significantly higher rate than females, which is similar to earlier reported studies (Bener et al. 2006a; Redelmeier and Tibshirani 1997; Violanti and Marshall 1996; Violanti 1997). Also, illiterate drivers were using mobile phones more often while driving than the educated drivers. This finding has important implications for safety interventions among illiterate drivers. For instance, an advertising campaign designed to reduce mobile phone use would not succeed in reaching one of its primary targets if the campaign were restricted to press advertising. In Table 1, we can also note the greater propensity for manual workers

(28.6%) and army or police officers (17.9%) to admit using mobile telephones while driving. Members of the police and army may have some justification for their use of mobile communications, as it may be an essential part of their job. In the present study, a worrying finding is the high number of mobile phone users driving 4WD vehicles. This may indicate that 4WD vehicles increase a driver’s (false) sense of safety and security. Alternatively, the 4WD vehicle may represent a choice of lifestyle that may correlate with risk-taking behaviour (Horswill and Coster 2002; Bener et al. 2006b). In addition, a negative relationship between mobile phone use, following the traffic lights and seat belt use frequency was found. Similar results have been found in previous studies (Hemenway and Solnick 1993). Obviously, risky mobile phone use is part of a risky driving style involving a great variety of risky behaviours.

In addition to general risky driving style, failure to stop at a red traffic light might be related to cognitive workload

Table 3 Factors associated with mobile phone use among drivers who were involved in road traffic crashes using stepwise logistic regression analysis

Independent variables	Odds ratio	95% confidence interval	p value
Vehicle type (4WD)	16.22	4.77–55.13	<0.001
Excessive speeding	1.60	1.15–2.22	0.004
Educational level	2.41	1.30–4.48	0.005
Crossing red signal	2.53	1.22–5.28	0.013

while having a mobile phone conversation. Delayed reactions to change in following distance have been reported in several studies (Crundall et al. 2005; Lamble et al. 1999; Seo and Torabi 2004; Strayer and Drews 2004). Recent results by Hancock et al. (2003) indicated that phone use seriously impairs crucial stopping decisions. Our study also showed that crossing a red signal was more significantly higher among the drivers who used a mobile phone while driving. De Waard et al. (2001) reported that looking at the phone numbers while holding the phone in one hand showed a serious deterioration in driving performance in terms of lane control.

The Road and Traffic Department in the State of Qatar has banned the use of handheld mobile phones as of September 2005. A fine of QRs 375 (equivalent to US \$.100) is imposed on the driver if caught using a phone while driving. The only advantage of mobile phone use is related to security and being able to contact or be contacted by someone when urgently needed. However, benefiting from these aspects of mobile phones does not require calling or answering a call while driving.

No documents are available in Qatar to collect the socio-demographic characteristics and behaviours of drivers who were involved in road traffic crashes. The study had to rely on self-reporting and the answers were cross-checked to find their reliability. One of the limitations of the study was that we had to rely on self-reports of the participants about their mobile phone use while driving. Also, information about the location and severity of injury at the time of crash was not recorded.

Conclusion

The present study revealed that the frequency of mobile phone use while driving was very high among Qatari drivers who were involved in traffic crashes. Males were found to have a higher accident involvement with mobile phone use than females. Speeding and red light violations were very common among the drivers who were involved in road traffic crashes with mobile phone use. The illiterate and young drivers were using a mobile phone more often than the educated and older drivers. Hence, the traffic safety department should target specific risk groups such as drivers with low levels of education and the young age drivers.

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Conflict of interest The authors confirm that there are no relevant associations that might pose a conflict of interest.

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