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Mobile phone use while driving and the risk of collision: A study among preparatory year students at King Saud University, Riyadh, Saudi Arabia

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Abstract:

OBJECTIVES: The objectives of this study were to determine the rate of mobile phones use while driving by the students of King Saud University, Riyadh, Saudi Arabia, their perception of the risks, and contribution to collisions.

MATERIALS AND METHODS: A cross-sectional study was conducted in May 2014 targeting 986 male students of King Saud University, Riyadh, Saudi Arabia. A questionnaire was used to obtain data on possessing a driving license, years of driving experience, driving hours, and collision or near misses in the 6 months preceding the study. Eight statements were used to assess the behavior and perceptions related to the use of mobile phones while driving. Data were analyzed using the Chi-square statistic, odds ratio, and the 95% confidence interval.

RESULTS: Almost half of the participants (45.3%) had driving experience of 4–6 years and 18.3% of them did not possess a driving license. Collision in the preceding 6 months was reported by 44.6% of participants, and 37.9% of them attributed these collisions to mobile phones. Variable proportions reported that they always texted (53.3%) or talked on a handheld (66.2%) or hands-free (26.1%) phones while driving. A higher proportion conceded that there were hazards in texting (77.0%) and speaking on handheld mobile phones (83.9%) rather than hands-free (35.9%) while driving. The risk increased significantly from 2.052 among participants who reported that they drove daily for 1–2 h to 3.165 of those who reported that they drove for more than 6 h. No significant risk was observed in relation to participants' perceptions, age, driving experience, and possession of a driving license.

CONCLUSIONS: There was a risk of collision with the use of handheld and hands-free mobile phones. As hands-free mobile phones are no safer, national legislation should consider restricting their use by drivers and implementing legislations to reinforce safety on the roads. An objective assessment of the contribution of mobile phones to road traffic injuries is recommended.

Keywords:

Driving, mobile phone use while driving, risk of collision, Saudi Arabia, texting

Introduction

Road traffic injuries rank the ninth leading global cause of the burden of disease and the third in the age group of 15–44 years.^[1] The Eastern Mediterranean Region (EMR) bears a heavy burden as the reported deaths from road traffic injuries in 2015 was 19.9/100,000

population, which is higher than the global rate of 17.4/100,000 population.^[2] This rate is the highest in high-income countries of the EMR and double that of high-income countries in other regions.^[2]

In view of the absence of public transportation, people in Saudi Arabia

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rely on their private cars as a mode of transportation,^[3] with 6,599,216 registered vehicles as of 2010.^[2] Between 2010 and 2014, the rate of road traffic fatalities increased from 6596 with an estimated 24.0 deaths per 100,000 population^[4] to 7661 with an estimated 27.4 deaths per 100,000 population.^[2] Mansuri *et al.*^[3] noted that young people are more frequently involved in road traffic crashes. It has been reported that almost 50% of university students have been involved in road traffic crashes and 22% of them have been injured in these crashes.^[5]

Williams^[6] drew attention to drivers' characteristics associated with road traffic injuries such as young age, risky patterns of driving, and the lack of experience. A major risk is distraction as the drivers engage in activities that divert their attention from the road while behind the wheel.^[2] Nowadays, the use of the mobile phone by drivers is the center of attention of policymakers concerned with improving road safety.^[2,7] The use of the mobile phone grew rapidly in Saudi Arabia to reach 49 million subscriptions at the end of 2016.^[8] The use of the phone is a source of visual, auditory, manual, and cognitive distraction^[6] associated with a fourfold increase in the risk of road traffic accidents.^[2,9] Previous reports from Saudi Arabia have revealed that young people are likely to have their mobile phones with them when driving^[10] and 85% of them use them,^[11] which contributes substantially to road traffic injuries.^[12] However, their exact contribution to road traffic crashes is not known as there is no system of data collection by the police department of the use of the phone in crashes.^[2,3]

The aim of the study was to determine the rate of mobile use while driving by university students, their perception of the risks, and the contribution to collisions.

Materials and Methods

A cross-sectional study was conducted in May 2014 of male Saudi students in the preparatory year of King Saud University, Riyadh, Saudi Arabia. The university admits nearly 7000 male students annually who are allocated to three tracks, namely humanities ($N_1 = 3000$), science and engineering ($N_2 = 3000$), and health ($N_3 = 1000$). To date, in Saudi Arabia, only males aged 18 and above are authorized to drive.^[13]

The sample size was estimated using the open access Epi-Info program.^[14] To obtain the largest sample size, it was assumed that 50% of students used mobile phones while driving. With a chosen 5% degree of precision, a design effect of 2.5 to compensate for complex sampling and 95% level of confidence, the estimated minimum sample size was 913 students and was allocated proportionally to the number of students in each of the three tracks. Student recruitment for the survey

was based on their availability in the food court during breaks.

Data were collected by a self-administered questionnaire designed for the purpose of the study and tested on a sample of students not included in the study. It asked if they had a driver's license, how many years of driving experience they had and the number of hours of driving they did per day. They were also asked whether they had been involved in a collision or near misses in the 6 months before the study. A total of eight statements responded to on a 3-point Likert scale were used to reflect students' behavior relating to the use of mobile phone while driving (three statements responded to with always, once in a while, and never), their perception of danger (two questions answered with agree, uncertain, and disagree) and susceptibility to being involved in road traffic accidents (three statements responded to with yes, uncertain, and no).

The study was approved by the Institution Review Board of the College of Medicine in King Saud University, Riyadh, Saudi Arabia. Students were reached during the lunch hour in the food court specified for each track of the preparatory year. They were informed of the purpose of the study emphasizing that participation was voluntary. Informed consent was obtained from the students before the distribution and the completion of the anonymous questionnaire.

Out of the 1100 questionnaire distributed, 991 were returned yielding a response rate of 90.1%. Five students were excluded from the study after data collection because they had not driven in the last 6 months. The final sample size considered for analysis was 986 representing students of humanities track ($n_1 = 403$), science and engineering ($n_2 = 472$), and health ($n_3 = 111$).

Data were analyzed using the Statistical Package for the Social Sciences (SPSS) version 21 (SPSS Inc. Chicago, Illinois, USA). Checking for data entry error was done by frequency distribution and cross-tabulation. Data were described using number and percentage as well as mean and standard deviation. The Chi-square statistics were used to test the association between collision and independent variables. The risk was quantified using the odds ratio (OR) and the 95% confidence interval (CI 95%). The significance of the obtained results was at the level of 5%.

Results

The highest percentage of students were 19 years old (64.5%) while the rest were 18 years old (8.0%) or 20–23 years old (27.5%). Students reported that they had driven for 1–3 years (44.3%) and 4–6 years (45.3%) while one-tenth reported they had driven for 7–9 years (8.4%)

and ≥10 years (2.0%). However, 18.3% (*n* = 180) did not have a driving license, 43.7% (*n* = 431) had had their driving license for a year or less, and 26.9% (*n* = 265) had had it between one and 2 years while the others (*n* = 110; 11.1%) had had it for more than 2 years. Most of students reported that they drove daily (*n* = 926; 93.9%); the majority reported that they drove for 3–4 h every day (*n* = 394; 42.5%) or ≥5 h (*n* = 312; 33.7%).

The majority of students (*n* = 833; 84.5%) reported using handheld mobile phones more frequently while driving (*n* = 775; 93.0%) than hands-free ones (*n* = 58; 7.0%). Collision in the 6 months before the study was reported by 44.6% (*n* = 440) of the students; 37.9% (*n* = 167) of these collisions were attributed to the use of the mobile phone. In addition, 84.3% (*n* = 832) reported near misses attributed to the use of mobile phones.

Inquiry into students' behavior in the 6 months before the study revealed that 66.2% of students always talked on handheld mobile phones while driving, 26.1% always talked on hands-free mobile phones, and 53.3% always read or sent text messages. The majority of students (83.9%) conceded that talking on handheld mobile phones while driving was hazardous while only 35.9% agreed that talking on hands-free devices while driving was hazardous. With regard to texting, 77.0% of the students agreed that it was wrong to text while you drove. The majority of students acknowledged that there was a higher risk of accidents associated with talking on handheld mobile phones (80.8%) while only one-third (33.3%) perceived the higher risk of accidents in talking on hands-free mobile phones while driving. The perception of a higher risk of accidents as a result of sending or reading text messages while driving was reported by 89.7% of the students [Table 1].

The risk of collision was significantly higher among students who used handheld mobile phones while driving (OR = 1.460; 95% CI = 1.023, 2.087) than hands-free phones (OR = 1.110; 95% CI = 0.564, 2.145). This risk was significantly higher among students who reported that they always talked on handheld mobile phones while driving (OR = 1.435; 95% CI = 1.019, 2.037) and hands-free mobile phones either always (OR = 1.469; 95% CI = 1.093, 1.975), or once in a while (OR = 1.599, 95% CI = 1.120, 2.282). A significantly higher risk was also observed among those who sent or read text messages either always (OR = 1.885; 95% CI = 1.400, 2.537) or once in a while (OR = 1.596; 95% CI = 1.085, 2.347). No extra risk was observed with regard to the perception of danger and the perception of susceptibility to accidents as a result of using a mobile phone while driving [Table 2].

There was a significant association between collision in the 6 months before the study and the time spent on

the road (*P* = 0.0175). The risk of collision is 2.052 (95% CI = 1.091, 3.858) among students who drove 1–2 h per day and increased significantly to 3.165 (95% CI = 1.603, 6.249) among those who drove for more than 6 h/day. In this respect, there was no significant association in relation to the age of the student (*P* = 0.2816), driving experience (*P* = 0.6240) or possession of a driver's license (*P* = 0.3523) [Table 2].

Discussion

Earlier reports from Saudi Arabia^[11] and the current study showed that 85% of young people used the mobile phone while driving. Almost two-thirds of the participants reported that they always spoke on handheld phones in the 6 months before the study, and half of them reported that they sent, received, and read text messages while they drove. Previous studies^[15,16] attributed the use of mobile phones while driving to the perception of low risk, which is contrary to the present findings. Indeed, a relatively high proportion of participants perceived the associated danger and susceptibility to accidents with using handheld mobile

Table 1: Perceptions and behavior of university students with respect to the use of mobile phone while driving (n=986)

Behavior in the 6 months before the study	Always N (%)	Once in a while N (%)	Rarely or never N (%)
Talking on handheld phone while driving	653 (66.2)	170 (17.3)	163 (16.5)
Talking on hands-free phone while driving	257 (26.1)	156 (15.8)	573 (58.1)
Sending or reading text messages while driving	526 (53.3)	173 (17.6)	287 (29.1)
Perception of danger	Agree N (%)	Uncertain N (%)	Disagree N (%)
Talking on handheld phone while driving is hazardous	827 (83.9)	68 (6.9)	91 (9.2)
Talking on hands-free phone while driving is hazardous	354 (35.9)	371 (37.6)	261 (26.5)
Texting while driving is a wrong behavior	759 (77.0)	156 (15.8)	71 (7.2)
Perception of susceptibility	Yes N (%)	Uncertain N (%)	No N (%)
Talking on handheld phone while driving increases the chances of accidents	797 (80.8)	102 (10.4)	87 (8.8)
Talking on hands-free phone while driving increases the chances of accidents	329 (33.3)	248 (25.2)	409 (41.5)
Sending or reading text messages while driving increases the chances of accidents	885 (89.7)	57 (5.8)	44 (4.5)

Table 2: Factors related to collision in the 6 months before the study

Factors	Collision		OR	95% CI
	Yes (n=440) N (%)	No (n=546) N (%)		
Age (years)				
18	42 (9.5)	37 (6.8)	1.450	0.877-2.397
19	279 (63.4)	357 (65.4)	0.998	0.750-1.329
≥20†	119 (27.0)	152 (27.8)	1.000	
Driving experience (years)				
1-3†	198 (45.0)	239 (43.8)	1.000	
4-6	193 (43.9)	254 (46.5)	0.917	0.703-1.196
≥7	49 (11.1)	53 (9.7)	1.116	0.725-1.718
Having a driving license				
No†	78 (17.7)	102 (18.7)	1.000	
≤1 year	206 (46.8)	225 (41.2)	1.197	0.844-1.699
1-2 years	110 (25.0)	155 (28.4)	0.928	0.633-1.361
>2 years	46 (10.5)	64 (11.7)	0.940	0.582-1.519
Daily driving (h)				
Not driving daily†	16 (3.6)	44 (8.1)	1.000	
1-2 h	94 (21.4)	126 (23.1)	2.052	1.091-3.858
>2-4 h	178 (40.5)	216 (39.6)	2.266	1.237-4.152
>4-6 h	91 (20.7)	107 (19.6)	2.339	1.237-4.421
>6 h	61 (13.9)	53 (9.7)	3.165	1.603-6.249
Student's perception of danger				
Talking on handheld phone while driving is hazardous				
Agree†	37 (8.4)	54 (9.9)	1.000	
Uncertain	33 (7.5)	35 (6.4)	1.380	0.731-2.592
Disagree	370 (84.1)	457 (83.7)	1.180	0.761-1.835
Talking on hands-free phone while driving is hazardous				
Agree†	123 (28.0)	138 (25.3)	1.000	
Uncertain	168 (38.2)	203 (37.2)	0.929	0.676-1.276
Disagree	149 (33.9)	205 (37.5)	0.815	0.591-1.125
Texting while driving is a wrong behavior				
Agree†	334 (75.9)	425 (77.8)	1.000	
Uncertain	75 (17.0)	81 (14.8)	1.178	0.834-1.664
Disagree	31 (7.0)	40 (7.3)	0.986	0.604-1.610
Factors	Collision		OR	95% CI
	Yes (n=440) N (%)	No (n=546) N (%)		
Student's perception of susceptibility				
Talking on handheld phone while driving increases the chances of accidents				
Yes†	351 (79.8)	446 (81.7)	1.000	
Uncertain	49 (11.1)	53 (9.7)	1.175	0.777-1.775
No	40 (9.1)	47 (8.6)	1.081	0.694-1.686
Talking on handheld phone while driving increases the chances of accidents				
Yes†	151 (34.3)	178 (32.6)	1.000	
Uncertain	119 (27.0)	129 (23.6)	1.087	0.782-1.513
No	170 (38.6)	239 (43.8)	0.838	0.626-1.124
Sending or reading text messages while driving increases the chances of accidents				
Yes†	397 (90.2)	488 (89.4)	1.000	
Uncertain	25 (5.7)	32 (5.9)	0.960	0.559-1.647
No	18 (4.1)	26 (4.8)	0.851	0.459-1.575

Contd...

Table 2: Contd...

Factors	Collision		OR	95% CI
	Yes (n=440) N (%)	No (n=546) N (%)		
Student's behavior				
Mobile phone used while driving				
Hand-held	360 (81.8)	415 (76.0)	1.460	1.023-2.087
Hands-free	23 (5.2)	35 (6.4)	1.110	0.564-2.145
None while driving [†]	57 (13.0)	96 (17.6)	1.000	
Talking on hand-held phone while driving				
Always	310 (70.5)	343 (62.8)	1.435	1.010-2.037
Once in a while	67 (15.2)	103 (18.9)	1.033	0.665-1.604
Rarely or never [†]	63 (14.3)	100 (18.3)	1.000	
Talking on hands-free phone while driving				
Always	128 (29.1)	129 (23.6)	1.469	1.093-1.975
Once in a while	81 (18.4)	75 (13.7)	1.599	1.120-2.282
Rarely or never [†]	231 (52.5)	342 (62.6)	1.000	
Sending or reading text messages while driving				
Always	262 (59.5)	264 (48.4)	1.885	1.400-2.537
Once in a while	79 (18.0)	94 (17.2)	1.596	1.085-2.347
Rarely or never [†]	99 (22.5)	188 (34.4)	1.000	

[†]Reference category. CI=Confidence interval, OR=Odds ratio

phones to talk and send text messages. Moreover, the current national legislation prohibits the use of handheld mobile phones while driving.^[2]

Of the participants, 44.6% reported having had collisions in the 6 months before the study and 37.9% attributed the collisions to the use of mobile phones. The risk of collision was significantly higher among participants who reported the frequent use of mobile phones whether as a handheld or hands-free devices to text and talk. This is in accord with previous studies^[9,17-20] that demonstrated a four-fold increase in the risk of motor vehicle crashes in relation to the use of mobile phones. Ishigami and Klein^[21] and Törnros and Bolling^[22] concluded that hands-free mobile phones had no safety advantage, and that both kinds of devices carried the risk of cognitive distraction with a considerable negative impact on drivers' performance by increasing the response time,^[23-27] enfeebling the evaluation of visual information, and detection of critical events.^[28-30]

All young men enrolled in this study started driving around the age of 18 years even before they were eligible for a driver's license. Actually, 18.3% of the participants drove without a driving license, a slightly higher percentage than the 12.4% reported from Saudi Arabia by El Bcheraoui *et al.*^[31] In Saudi Arabia, it is necessary for young men to drive because of the lack of public transportation and the cultural restrictions on women. These young men are responsible for running all errands for the family, which is why they drive for long periods every day even when they have no driving license. Previous studies^[17,32,33] as well as the present show an

increased risk of collision with an increased number of hours spent on the roads.

This study has provided useful information on the rate of use of mobile phones and its contribution to the risk of collisions. However, the findings should be interpreted with two limitations in mind, the cross-sectional nature of the design precluded the establishment of causal relationship and reliance on students' self-report. The alternative objective approach would have been a roadside count of drivers who used mobile phones as they drove,^[34-37] which would have been costly and might have missed the use of hands-free mobile phones.^[38] The current study included a homogeneous group of young men recently graduated from high school who considered the mobile phone an important tool of communication and tended to use it extensively.^[39] Although they are aware of the dangers of using them while driving, they still use them to talk and text. Hands-free mobile phones were introduced to allow drivers to make calls without taking their eyes off the road but not their minds. This fact should be made clear to young men who perceive their use as relatively safe.

Conclusion

The national legislation should be made to cover the prohibition of the use of hands-free mobile phones while driving. Furthermore, the system should be revised to reinforce the implementation of legislations that ensure safety on the roads. Future studies should consider an objective assessment of the contribution of mobile phones to road traffic injuries as the design of this study obviously did not involve fatal accidents.

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Conflicts of interest

There are no conflicts of interest.

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