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Characteristics and mitigation strategies for cell phone use while driving among young drivers in Qatar

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ABSTRACT

There is no doubt that cell phone use while driving can lead to a higher probability of driver error, which increases the likelihood of more crashes. In Qatar, the high rate of cell phone use while driving among young drivers is a major traffic safety concern. The objectives of this study are to identify the factors affecting this hazardous behavior and to suggest practical solutions to deter this specific category of drivers from driving while distracted. The study combined stated and revealed preference questions to design a detailed survey questionnaire. Data were collected from a sample of 403 young drivers. The structural equation modeling results showed that, for the revealed preference, conducting public campaigns may provide a suitable solution to reduce cell phone usage while driving. On the other hand, increasing enforcement did not seem to have a significant effect on reducing this type of behavior. For the stated preference, young drivers who had a crash history resulting from cell phone usage tend to use their cell phones less than those who did not have a cell phone related crash. Furthermore, the driving experience and safe duration of distraction had a significant effect on the cell phone usage. Based on the results, it is recommended to provide road safety campaigns to educate young drivers on the risk associated with such behavior. This information is valuable to legislators and traffic safety experts dealing with this problem in Qatar and other countries in the region.

1. Introduction

Distracted driving happens when the driver is engaged in an activity that distracts him/her from the main task of driving. This distraction can occur in three forms. The first is known as the visual processing distraction and occurs when drivers remove their eyes off the road. The second is known as the manual interference and happens when drivers remove their hands off the steering wheel while driving. The last method, cognitive, occurs when drivers are distracted from information processing needed to operate their vehicle. More than one of these types of distraction can occur at one time (Strayer et al., 2013). A study showed that less than a third of road users are distracted by cell phones, whereas almost three-quarters are distracted by other behaviors, (Ortiz et al., 2016). Cell phones have evolved over the years from a device used for making a phone call or sending a text message to a "smartphone" that can be used for multiple purposes, including but not limited to sending/receiving emails, Internet browsing, music, camera, games, a navigation system, scheduling, and many other purposes depending upon the applications installed. This indicates that the impairment due to cell phone usage might have increased over the years. These types of behaviors can have negative effects on drivers. A study found that driver distraction in the form of mobile phone use and conversation with the passenger can affect the driving

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performance (Yannis et al., 2015). Another study showed that using the cell phone while driving increases the reaction time for drivers, especially among female and older drivers (Papantoniou et al., 2015). This distraction leads to a higher probability of driver error, which increases the likelihood of a crash (Wilson et al., 2015; Ige et al., 2016). According to a National Highway Safety Administration (NHTSA) report, cell phone use was the cause of 445 fatalities in one year in the United States (NHTSA, 2015). Studies also show that young drivers are relatively responsible for more crashes than old drivers are (Jones, 2015a, 2015b). A study from the United States has shown that, at the time of the crash, approximately 8% of drivers were distracted. For young drivers, the average was higher (11.7%) (Stutts and Hunter, 2003). Another study found that younger drivers tend to have a high involvement in crashes caused by driver distraction (Klauer et al., 2006). Previous research has shown that these types of behaviors occur among young drivers due to being unaware of the impact of distracted driving on the driving performance (Horrey et al., 2008; Lesch and Hancock, 2004) or being aware but still engage in this type of activity (Walsh et al., 2008; Vanlaar et al., 2008).

The objectives of this study were to understand the different cell phone use habits among young drivers in Qatar, understand their awareness about the danger of these habits, and investigate the factors affecting their behavior using a self-report questionnaire. Qatar is a high-income developing country located in the Middle East. The population rapidly increased from 613,969 in 2000 to 1,832,903 in 2012. During the same period, the number of daily trips increased by 209%, and the number of vehicles increased by 206%. This huge increase caused a significant increase in the number of traffic crashes. From 2001 to 2011, crashes have almost tripled from 57,951 to 160,557 in Qatar (Shaaban and Hassan, 2014; Shaaban and Kim, 2016). Traffic crashes are one of the top causes of deaths in Qatar with 15.2 deaths per 100,000 population. In Qatar, the 18 to 25 years age group formed 32.6% of the total fatalities, 29.3% of the total major injuries, and 26.9% of the total minor injuries in 2011. These percentages are considered the highest among the different age categories and identify a significant issue among the young drivers' category (Shaaban and Hassan, 2017). Another study in Qatar revealed that young drivers have the lowest compliance rate among drivers at minor-street stop-controlled intersections (Shaaban et al., 2017). Furthermore, an observational study in Qatar revealed that young drivers use their cell phones while driving at a much higher rate (20.2%) than middle-aged drivers (10.5%), and older drivers (8.0%) (Shaaban, 2013). The study aims to improve the understanding of young driver behavior when distracted by cell phones being a higher-risk group compared to the other age groups. The study also aims to analyze the impacts of these attitudes on road safety while also exploring potential countermeasures from the perspective of drivers themselves. More specifically, the study identifies how this group of drivers uses their cell phones while driving, what they think are the most appropriate practices for this behavior, how risky they feel about such behavior, and what they are willing to do to resolve this problem. The outcomes from this research would enable policymakers to assess the impacts of past policies on cell phone distracted driving activities while also assisting officials in looking for more effective policies when dealing with such offenders.

2. Background

Researchers have utilized different approaches to investigate the effect of cell phone usage as a driving distraction on the driving behaviors of motorists. Survey questionnaires based on driving simulator experiments were extensively used to investigate the effect of cell phone usage on driving behaviors (Rumschlag et al., 2015; Yannis et al., 2014, 2016). These studies might provide a reflection of the revealed preference of participants as it is based on a driving simulator experience. However, the large degree of control using driving simulators would make the applicability of the results to real life more difficult. Other studies used naturalistic driving data to examine the impact of cell phones usage on driving (Precht et al., 2017; Xiong et al., 2015; Ye et al., 2017). Long study time, uncontrolled environment, and subjectivity in observations could be considered as disadvantages for the naturalistic studies. Other studies utilized survey questionnaires in conducting studies related to distraction resulting from cell phone usage (Beck et al., 2007; Gao et al., 2014; Zhao et al., 2013). One of the main limitations of the self-reporting questionnaires is how accurate the stated preference of the participants reflects their actual driving behaviors.

Different methodologies were used in analyzing data obtained from survey questionnaires. Quasi-induced exposure was used to estimate the relative risk for cell phone use while driving. The results showed that an increase in accident risk was found for hand-held cell phones and for hand-held and hands-free phones together. In addition, a non-significant increased risk for hands-free cell phones was detected (Backer-Grøndahl and Sagberg, 2011). Another study used logistic regression to predict cell phone usage while driving as a function of demographic factors. The results showed that the significant predictors for cell phone usage in Alberta, Canada, were gender, age, employment status, home ownership, household income, immigrant status, and risk perceptions (Nurullah et al., 2013). Waddell et al. used hierarchical multiple regression analyses to examine psychosocial influences on drivers' intentions to use a hand-held cell phone, investigate the effect of the descriptive norm on the predictive ability of the theory of planned behavior model, and to examine drivers' behavior for initiating and responding to cell- phones while driving. The results showed that attitude, subjective norm, perceived behavioral control, and descriptive norm were of drivers' intentions to engage in both initiating and responding behavior (Waddell and Wiener, 2014). Furthermore, repeated measures ANOVA tests were used to investigate the effects of the phone use conditions and driver demographics on driving performance. The results showed a significant decrement in the driving performance while conducting texting tasks. The results also showed a reduction in driving ability when having a conversation or texting on the phone while driving. Sufficient attention to the road ahead, responding to sudden traffic events, and controlling the vehicle were significantly affected when using cell phones while driving (Choudhary and Velaga, 2017).

This paper investigates the factors affecting cell phone distracted driving in Qatar and explores the potential solutions for the problem. The data used in this study was collected through face-to-face interviews conducted in Qatar. The survey was directed at young people between 18 and 25 years old with a valid driver license from both genders with different ages and nationalities, who regularly drive a car and reside in Qatar. The analysis in this study was conducted using a structural equation modeling technique.