Accident Analysis and Prevention 96 (2016) 56–63

Contents lists available at ScienceDirect

Accident Analysis and Prevention

journal homepage: www.elsevier.com/locate/aap

# An observational study of secondary task engagement while driving on urban streets in Iranian Safe Communities

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ARTICLE INFO

*Article history:*
Received 26 January 2016
Received in revised form 15 July 2016
Accepted 17 July 2016

*Keywords:*
Potentially distracting activity
Secondary tasks
Mobile phone
Observational study
Safe Communities
Iran

ABSTRACT

In Iran the prevalence of traffic injuries and death from vehicle collisions are high. Driver engagement in non-driving-related tasks has been previously identified as an important contributing factor to crashes. Therefore, the objective of the present study was to investigate the prevalence of drivers' engagement in potentially distracting activities in Kashmar, Khalilabad and Bardaskan, which are three Iranian International Safe Communities. Observations took place at 12 randomly selected roadside locations in each city, which were comprised of six main streets and six side streets. In total 7979 drivers were observed. The prevalence rates of potentially distracting activities in Kashmar, Khalilabad and Bardaskan were 24.3%, 26% and 24.9%, respectively. In both Kashmar and Khalilabad the most frequently observed secondary tasks were drivers talking to passengers (10.6% and 11.5%, respectively) followed by mobile phone use (3.4% and 4.0%, respectively). Although in Bardaskan the most commonly observed secondary task was also talking to passengers (12.7%), the second most common was reaching for an object (3.2%). In all three cities younger drivers were significantly more likely to be observed engaged in a secondary task while driving. Furthermore, involvement in secondary tasks while driving was significantly higher amongst females and those driving on a working day. The percentage of drivers identified as potentially distracted in these three Safe Communities was worryingly high. Thus, interventions should be integrated into the WHO Safe Community network in these cities, including: education regarding the risks associated with engaging in secondary activities while driving, law enforcement, tougher legislation, periodic assessment, raising public awareness, as well as attracting political and social support.



## 1. Introduction

Road traffic crashes (RTC) pose a major threat to public health and are a substantial socioeconomic burden for most nations, especially low and middle-income countries (LMIC) (Murray and Lopez, 1997; Peden, 2004). In Iran, which is a medium-income country, there were a total of 414161 traffic injuries recorded in 2010 (Bahadorimonfared et al., 2013) and a traffic fatality rate of 34.1 per 100,000 inhabitants (World Health, 2013), which is relatively high by global standards. The occurrence of traffic crashes is due to an interaction between the driver, the vehicle and the environment. Moreover, human factors have been identified as the main cause of traffic crashes, being the sole cause of more than 50% of all collisions (Lewin, 1982).

Driver distraction is one of the many human factors that can cause or contribute to a crash. Driver distraction has been defined as "a diversion of attention from driving, because the driver is temporarily focusing on an object, person, task or event not related to driving, which reduces the driver's awareness, decision making ability and/or performance, leading to an increased risk of corrective actions, near-crashes, or crashes" (Hedlund et al., 2005).

The importance of driver distraction as a contributing factor in RTC has received a lot of attention in recent years, due in part to the increasing use of modern technologies in vehicles, such as mobile phones and Global Positioning System (GPS) devices (Sullman, 2012; Huisingh et al., 2015). Furthermore, there are many other activities that can potentially distract a driver, such as: talking to passengers (Koppel et al., 2011), eating and drinking (Engstrom

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http://dx.doi.org/10.1016/j.aap.2016.07.020
0001-4575/

et al., 2008), manipulating vehicle electronics (Stutts et al., 2001), as well as the environment outside the car (Stutts et al., 2005).

In the United States, in 2010, some types of distractions or secondary tasks have been shown to cause about a fifth of motor vehicle collisions according to the National Highway Traffic Safety Administration (NHTSA), and in 2012 driver distraction was reported to be a contributing factor in 3328 fatalities and 421,000 injuries (Ascone et al., 2009; NHTSA, 2013).

Engaging in a secondary task while driving also has adverse economic effects. For instance, a Harvard study has estimated that the annual cost of crashes associated with mobile phone use to be US $43 billion (NHTSA, 2013).

A large body of research has investigated the prevalence of mobile phone use while driving, as one type of potentially distracting activity amongst drivers, but there is little observational research that has more broadly studied the prevalence of driver engagement in secondary tasks while driving.

In one of the few roadside observational studies which investigated this issue, using fixed cameras on high speed highway at different locations across the span of the New Jersey turnpike to take photographs both during the day and night, Johnson et al. (2004) found that 4.16% of the drivers were engaged in some type of secondary task at speeds of 100 feet per second or greater, with the most common being mobile phone use. Another US study used roadside observations to collect data close to intersections on arterial/collector roads and local streets, in different types of traffic flow (stopped, slow moving, moderate congestion, free flowing) and different estimated vehicle speed (stopped, <25, 25–50, >50 miles per hour) were observed. This study found that 32.7% of the drivers observed were engaged in a secondary task, with talking to passengers being the most common non-driving-related activity (Huisingh et al., 2015). Furthermore, research has also been undertaken in six urban centres in the UK (Sullman, 2012). Observations took place on 30mph roads at least 100 m from controlled intersections and only vehicles in motion were included. This research found that 14.8% of British drivers were engaged in some type of secondary task, with talking to passengers again being the most frequent. In a second UK study, which was carried out in a single city under the same conditions this figure was found to be 16.8%, with the most common secondary task again being talking with passengers (Sullman et al., 2015).These findings were largely supported by two separate studies in Spain which reported that the prevalence of secondary task engagement was 19%, and talking to passengers was the most commonly observed activity (Gras et al., 2012; Prat et al., 2014). Spanish studies were carried only on motor vehicles travelling in the lane closest to the curb in urban locations during the day and all roads had a legal speed limit of 50 km/h.

In-car naturalistic observational research using sensors, video cameras and recorders constitute another approach to assessing the prevalence of driver engagement in secondary tasks. A naturalistic study in the US (Stutts et al., 2005) found that drivers were engaged in some type of secondary task 31% of the time the vehicles were moving. The results of another American study showed that participants engaged in potentially distracting behaviours about 34% of their driving time (Sayer et al., 2005). In the 100- car study, Klauer et al. (2006) found that 44% of drivers were engaged in secondary tasks. Furthermore, these drivers engaged in secondary tasks 23.5 percent of the time that they were driving.

The Safe Communities (SC) concept was introduced at the First World Conference on Accident and Injury Prevention held in Stockholm, Sweden in 1989. Three following core values have shaped the vision and focus of International Safe Communities around the world, which are:

1. Safety is a fundamental human right;
2. People are at the heart of making communities safer places in which to live, work, learn, travel and play; and
3. Everybody has a responsibility to promote, maintain their safety and the safety of others (Tasman, 2015).

The WHO Safe Community (SC) model is an international, sustainable, intersectional, community-based and integrated approach that aims to achieve safety promotion based on injury prevention. The model emphasizes community participation and cultural, social and political support. Therefore, multidisciplinary cooperation and collaboration must take place between non-government organizations, the business sector, local and government authorities and part of the World Health Organization (WHO) Safe Communities Coalition. Furthermore, programs based on the Safe Community model focus on high-risk groups and environments, in order to promote safety for vulnerable groups. Also, the most prevalent causes of injuries must be documented, and programs are implemented based on the available evidence. Lastly, a principal component of this model is the assessment of programs, processes and achievements (WHO Collaborating Centre on Community Safety Promotion (WHO CCCSP), 2014).

In 1989, Lindkoping in Sweden was designated as the first International Safe Community in the world. In 2014, 25 years later a total of 362 communities from 29 countries were members of the WHO Safe Community. At present programs based on the International Safe Community model have been implemented in seven Asian countries, including: China, Iran, Vietnam, South Korea, Israel, Japan and Thailand. Iran is one of the most active nations with regards to implementing ISC programs, and a total of 34 Iranian cities and municipal districts are designated as members of the WHO Safe Communities networks (WHO Collaborating Centre on Community Safety Promotion (WHO CCCSP), 2014). In 2007, Kashmar in the east of Iran became the first Iranian Safe Community, followed by Bardaskan and Khalilabad, which were designated as Iranian members of this international network in 2009 and 2010, respectively (Rahimi-Movaghar, 2010; Safe Community Bardaskan, 2007; Safe Community Khalilabad, 2010). Iranian Safe Communities are involved in implementing plans in different safety areas, and traffic injury prevention is considered a priority in the interventional programs based on the ISC model in Iran (Safe Community Association (S.G.A), 2014).

To the best of our knowledge, this is the first roadside observational study to broadly investigate the prevalence of secondary tasks in a developing country and whether there are differences according to: driver age, gender, street type (main and side streets), day of the week (weekdays/weekend) and time of the day (morning and afternoon). This study aims to provide evidence-based information on secondary task engagement which can be used to develop interventional programs based on the WHO Safe Community model.

## 2. Methods

This roadside observational study of secondary task engagement while driving was carried out in Kashmar, Khalilabad and Bardaskan. These three cities are located in the east of Iran and their populations in 2011 were 157149, 72626 and 49111 people, respectively (Statistical Centre of Iran, 2011).

### 2.1. Timing & locations

The observations took place between July and August 2014 on Friday (Iranian weekend) and Monday (working day) from 9 to 10:30 am and 4–5:30 pm. Observations were undertaken in July and August because the temperate climate and weather condition dur-