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Analysis of factors affecting drivers' choice to engage with a mobile phone while driving in Beijing

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ABSTRACT

In the current work, we examined reasons that drivers choose to engage with a mobile phone while driving in Beijing. An Internet survey was administered to collect data about talking and texting while driving. Conversations were sorted into different types. Respondents were requested to indicate the frequency of initiating a call or text, perceived risk, perceived importance and emotionality of the call or text. A structural equation model of talking and texting while driving was developed with perceived risk, perceived importance and emotionality of the call as predictors and compared to a similar model with U.S. drivers. Unlike the U.S. data, perceived risk has a significant negative impact on the choice to call or text among drivers in Beijing. Results also show that perceived importance of the call is a major factor affecting the usage of phone while driving. Even though drivers know it is dangerous and illegal, Beijing drivers choose to talk on mobile phones while driving, but they prefer not to text.

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1. Introduction

Driving distraction, especially mobile phone use while driving, has become common. Mobile phone use while driving diverts attention away from driving and increases the likelihood of traffic accidents (McEvoy & Woodward, 2006). In China, the Standing Committee of the National People's Congress (2003) has created legislation to restrict the use of mobile phones while driving, both for handheld and hands-free phone use, but mobile phone use while driving still persists. This study aimed to explore why drivers in large urban areas in China use mobile phones while driving.

A number of studies have focused on the risks associated with phone use while driving, finding that even hands-free phone use impairs driving performance (Haigney, Taylor, & Westerman, 2000; Horrey & Wickens, 2006; Nasar, Hecht, & Wener, 2008). Treffner and Barrett (2004) studied drivers on a closed circuit driving track to study the influence of hands-free mobile phone use while driving. They showed that a driver's sensitivity to perceptual information and their perception and awareness of the road conditions were significantly degraded. Hancock, Lesch, and Simmons (2003) examined the effects of phone use on drivers' actions during a crucial driving maneuver. Drivers were requested to respond to a phone when faced with making a stopping decision while driving a real vehicle around the test track. In the dual-task condition, drivers responded slower to the stop-light and they braked more intensely. Many researchers (Backer-Grøndahl & Sagberg, 2011; Caird, Willness, Steel, & Scialfa, 2008; Holland & Rathod, 2012; Horberry, Anderson, Regan, Triggs, &

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Brown, 2006; Ishigami & Klein, 2009) have indicated that both hand-held and hands-free phone use while driving increases accident risk, and the frequency of using a phone while driving significantly correlates with crash involvement (Gras et al., 2007). Simply using a phone while at a signalized intersection increased accident risk as well (Liu & Lee, 2005).

One important question is why drivers continue to engage in this risky behavior. It may be that drivers are unaware of the risk or that mobile phone technology is so compelling that drivers ignore known risks. One study conducted in France, where phoning while driving is legally restricted, tried to identify the profiles of drivers who talk on a phone while driving (Brusque & Alauzet, 2008). They collected samples by interviewing the French drivers by telephone. Results showed that for men, the main explanatory factor of phone use while driving was age, followed by work-related reasons and extensive phone use in daily life. For women, high mileage and intensive phone use were the only two factors. Business drivers made frequent and extensive use of mobile phones while driving (Hislop, 2012).

Other studies have examined the effect of attitudes, norms, control factors, and risk perceptions on drivers' mobile phone use while driving, which are almost based on questionnaire survey. In one such study, researchers utilized the theory of planned behavior (TPB) (Ajzen, 1991) as a predictor for mobile phone use and found that attitudes consistently predicted drivers' intentions to use a mobile phone while driving and that drivers would answer the call if the caller was a significant other, such as a boyfriend or girlfriend (Walsh, White, Hyde, & Watson, 2008). In general, perceptions of control and perceived risk were not predictors for safer driving intentions. A similar disconnect between perceived risk and phone use while driving has been found among college students for calling (Nelson, Atchley, & Little, 2009) and texting while driving (Atchley, Atwood, & Boulton, 2011). Zhou, Rau, Zhang, and Zhuang (2012) found that intention to answer and perceived behavioral control were consistent predictors of whether drivers engage in compensatory behaviors, such as using hands-free devices or limiting call length.

The contents of conversation and driving conditions also influence phone use while driving. Nelson et al. (2009) examined reasons why younger drivers choose to talk on a phone while driving and showed that young drivers still initiated or answered some phone calls even though they perceived the risk of this behavior, because they perceived the calls as important. A study that attempted to examine the relationship between driving conditions and dangerous driving behaviors by simulation found that drivers had more dangerous behaviors when they were in an emotional call than in no call or a mundane call (Dula, Martin, Fox, & Leonard, 2011).

Texting is not as common as talking while driving and is the subject of less research. Harrison (2011) found more than 50% of college students in United States texted fairly often while driving. A study of driving simulation indicated that texting decreased the time drivers spent observing the road and increased their workload (Young, Rudin-Brown, Patten, Ceci, & Lenné, 2014). The impairment is worse for older drivers (Rumschlag et al., 2015). Yan, Wong, Li, Sze, and Yan (2015) found impairment for both English and Chinese texting input styles, resulting in increased reaction time and driving speed fluctuations.

The research clearly shows that drivers will use phones despite knowing the risk and despite laws that prohibit their use. In order to develop effective safety campaigns, we must understand driver motivations. These motivations may be highly influenced by culture, as well, leading us to want to understand what motivates drivers in China to use phones while driving. Numerous recent studies have suggested that drivers in Beijing may engage in a number of driving practices that are culturally unique (Shi, Bai, Ying, & Atchley, 2010; Shi, Bai, Tao, & Atchley, 2011). Almost all the recent literature investigates drivers in developed countries, despite clear cultural differences that lead to different outcomes for driving safety culture (Atchley, Shi, & Yamamoto, 2014). The current study examines the factors influencing phone use while driving, for both texting and talking, in a representative developing country, China.

The focus of this study is to explore how often people talk and text on a mobile phone while driving in Beijing, and the factors that affect their decisions. The current study referred to the method of Nelson et al. (2009) and Atchley et al. (2011), to make the work more directly comparable to an established driving culture (the United States, in this case). In addition, this study explored the influence of different factors between texting and calling while driving, which was not considered in the previous research such as personal characteristics, conversation types and driving conditions. The relationships among the perceived importance of the call, perceived risk, emotionality of the call and the frequency of phone use while driving were also examined. We hypothesized that the perceived importance of the call will encourage the usage of phone while driving, while perceived risk discourages the usage. We also hypothesized that the perceived risk of texting is higher than talking, which may lead to different frequency of the two behaviors.

2. Method

2.1. Participants

We conducted questionnaire surveys via the web to obtain the data for this study. A link to a survey entitled "Survey of Car Drivers' Distracted Driving Behavior in Beijing" was published on the website <http://www.sojump.com/jq/1128826.aspx>, and the IP, user name of respondents and answering time were collected to eliminate multiple entries from the same driver. Shi et al. (2010) have shown the results of paper surveys and an online survey have good consistency in a sample of Chinese drivers. An Internet survey can also be cost effective, producing quick responses (Weible & Wallace, 1998) and resulting in less missing data (Stanton, 1998). The participants were restricted to non-commercial drivers. 414 responses were collected

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