Accident Analysis and Prevention 67 (2014) 14–20

Contents lists available at ScienceDirect

Accident Analysis and Prevention

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

Effects of an adult passenger on young adult drivers' driving speed: Roles of an adult passenger's presence and driving tips from the passenger

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ARTICLE INFO

Article history:
Received 8 October 2013
Received in revised form 30 January 2014
Accepted 30 January 2014
Available online 10 February 2014

Keywords:
Effects of adult passengers
Driving speed
Young drivers
Shared situation awareness
Transfer of passenger effect

ABSTRACT

An adult passenger has been known to facilitate young drivers' safe driving. This study examined whether the adult passenger's effect is produced by the simple presence of an adult passenger or by the driving tips offered by the passenger. Further, we examined whether the effect would be transferred to when a young driver drives alone without the adult passenger in the following session. Three groups of participants drove on expressway in a driving simulator, either alone, with a silent adult passenger, or with an adult passenger who gave advice on driving safety. After a break, participants in all three conditions drove on the same expressway alone. Results showed that participants who drove with an adult passenger providing driving tips drove more safely than the other groups, and the effect was transferred to even when they drove alone afterwards.

Introduction

The high death rate among young drivers (Elvik et al., 2009; Maycock et al., 1991; Mayhew et al., 2003; McCartt et al., 2009; OECD, 2006; Regan and Mitsopoulos, 2001) has made researchers focus on the circumstances associated with the risk of car crash among young drivers. Along with individual features of young drivers such as poor hazard perception and overconfidence in driving skills (Jonah, 1986; Patten et al., 2006; Pollatsek et al., 2006), research has suggested a few environmental factors jeopardizing young drivers' safe driving. One of the well-known factors is the effect of peer-age passengers. It has been found that peer-age passengers are associated with young drivers' risks and restrictions on driving with peer-age passengers reduce traffic accident rates effectively among young drivers (Aldridge et al., 1999; Chaudhary et al., 2007; Chen et al., 2006; Doherty et al., 1998; Masten and Hagge, 2004; Morrisey et al., 2006; Preusser et al., 1998; Rice et al., 2004; Simons-Morton, 2007; Simons-Morton et al., 2005).

Although the detrimental effects of peer-age passengers seem to be evident, the presence of a passenger with young drivers is not always harmful to safe driving. The passenger's age is one of the important moderators affecting young drivers' driving behaviors since adult passengers seem to facilitate safe driving (Aldridge et al., 1999; Ouimet et al., 2010; Simons-Morton et al., 2011; Regan and Mitsopoulos, 2001). For instance, Aldridge et al. (1999) found that young drivers show the lowest crash risk when carrying an adult passenger as well as a child. Ouimet et al. (2010) examined young male and female drivers' fatal crash risk as a function of their passenger's age and gender, using per 10 million vehicle trips (VT) and vehicle-miles traveled (VMT) data. The results clearly showed that the highest risk was found for young male drivers with peer-age male passengers, and detected the general protective effects of adult passengers aged over 35 and passengers under 13. In spite of the clear effects of adult passengers shown by past research, the role of adult passengers has not shed light on experimental designs. Moreover, it has not been clearly addressed why adult passengers reduce young drivers' risky or reckless driving behaviors.

Social facilitation and perceived social norm

The theoretical explanations of adult passengers' effect have not yet been dealt in many literatures on youth driving. However, we can borrow some ideas from theories on the effect of peer-age passengers on young drivers in order to aid our understanding, such as social facilitation and perceived social norm. Social facilitation

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http://dx.doi.org/10.1016/j.aap.2014.01.024

models posit that the presence of others promotes one's performance of a familiar task, whereas it degrades one's performance of a complex and novel task. Also, it increases one's level of arousal and apprehension of being evaluated by others, which may cause such social facilitation effects (Cottrell et al., 1968; Zajonc, 1965). It is possible that young drivers could feel more anxious when they accompany adult passengers rather than peer-age passengers because an adult can be perceived as an evaluator. Therefore, adult passengers are postulated to improve safe or slow driving of young drivers rather than peer-age passengers, under the circumstances that driving is perceived as a complex and unfamiliar task by young drivers. However, the findings of the previous research on the effect of adult passengers are limited to show the fact that young drivers carrying adult passengers drive more safely than the drivers alone. Furthermore, the social facilitation models in young drivers' driving have not been examined by using an experimental design.

More persuasive approach is 'perceived social norm theory', which suggests that the underlying mechanism in passenger effect is not the characteristic of the passenger or the presence itself, but how the driver perceives the passenger's characteristic (Parker et al., 1992; Scott-Parker et al., 2009; Shepherd et al., 2011). Focusing on the social relationships between the drivers and their passengers as well as the role that the passenger has in relation to the drivers, the social norm theory suggests that driving behaviors are very much influenced by passengers' expectations and judgments. Social norms play an important role on peer pressure which is one possible type of social influences among adolescents. Young drivers would demonstrate more risky and reckless driving behaviors when they accompany peer-age passengers than adult passengers, because young passengers usually convey peer pressure for risky behaviors. Hu et al. (2012) examined the role of social cognition of young drivers in their experimental studies, in which 'an aggressive supervisor' as a passenger increased drivers' propensities for risky driving more than 'a cautious friend' passenger did. Their results indicate that passenger effects on young driver's driving may be the outcome of other factors such as perceived social norm rather than the passenger's characteristic itself. Although social facilitation models and perceived norm theory differently describe the effect of adult passengers, both theories make it possible to predict that the presence of an adult passenger itself would have a positive impact on driving behaviors in young drivers.

Mutual engagement of a driver and an adult passenger

In addition to social facilitation and social cognition, just talking with an adult passenger might decrease young drivers' risky driving. In real life, conversations while driving can play a more critical role in safe driving than social facilitation effect or driver's perceived social norm for passengers. Research on the relationship between in-vehicle conversations and drivers' safety has focused mostly on the cellular telephone use while driving. There has been a consistency in findings that conversation on a cellular telephone hinders driver's safe driving (Alm and Nilsson, 1995; Horrey and Wickens, 2006; Redelmeier and Tibshirani, 1997; Strayer et al., 2003). Cell phone use on driving was known to be even a more dangerous behavior than in-vehicle interactions with a passenger, regardless of their similarities in that both behaviors mainly involve talking with someone. Studies on the differences between cellular telephone and passenger conversations have proposed that there are two protective functions of passenger conversations for safe driving: Modulation of a conversation and mutual engagement of a driver and a passenger into the driving task. They are originated from their shared situation awareness of the driving environment (Drews et al., 2008; Rivardo et al., 2008; Strayer and Johnston, 2001). Situation awareness proposed by Endsley (1995) has been recognized as critical for successful decision making across constantly changing dynamic situations such as driving and aviation. Conversations with a passenger may affect driver's situation awareness. Whereas modulation of a conversation plays a passive protecting role in safe driving by not interfering with the driver's driving task when the difficulty of the driving increases, engagement of a passenger may actively promote safe driving by driving tips provided by the passenger. Rivardo et al. (2008) found that drivers conversing with passengers were given more driving tips than drivers conversing with blind passengers (similar to interlocutors conversing on cellular telephone). Moreover, Drews et al. (2008) studied the effects of in-vehicle conversations on simulated driving and suggested that passengers actively help drivers drive safely through talking more about the surrounding traffic.

These studies also implicate conversations including references to traffic or driving tips as key factors to the effect of adult passengers. In other words, the positive influences of adult passengers on young drivers can be due to passengers' reference to the surrounding traffic and driving tips as well as the presence of adults as evaluators (social facilitation effect) or the drivers' perceived social norm (perceived social norm theory). Simons-Morton et al. (2011) have found a protective effect of adult passengers in their recent study and suggest that the protective effect of adult passengers may occur due to co-driving or managing the in-vehicle context. For young drivers accompanying peer-age passengers, even if they also talk about the driving environment with their peers (Rivardo et al., 2008), the references to the surrounding traffic do not seem to improve safe driving as indicated by the research on the negative effects of peer-age passengers (Chen et al., 2000; Doherty et al., 1998; Preusser et al., 1998; Rivardo et al., 2008; Simons-Morton et al., 2005). On the contrary, adult passengers can contribute to the safety of young drivers by giving advice about the traffic and providing appropriate driving tips.

Current study

Adult passengers have been found to enhance the safe driving of young drivers while peer-age passengers have an adverse influence on it. The purpose of this study is to determine whether the effect of mature adult passengers[1] with a young driver is driven by the mere presence of an adult passenger or the driving tips given by the adult passenger that affects driving behaviors of young drivers. To complement the limitations of the field studies in prior research on the effect of adult passengers, we performed an experimental study using a driving simulator to examine adult passengers' effect under a controlled setting. In addition, we tried to explore the persistence of the effect by examining whether the effect retains for later solo driving.

In the present study, we manipulated the presence of an adult passenger to examine whether adult passengers' effect specifically results from the presence of an adult passenger or from the tips on driving safety given by the passenger. Three groups of young drivers either drove alone without a passenger, with a silent adult passenger, or with an adult passenger providing advice on driving safety. Then, all participants from the three groups drove the same track in the simulator exclusively without a passenger so that we could examine whether the passenger effect observed in the previous session would be transferred to the time when a young driver drove alone afterwards. It was hypothesized that young drivers with an adult passenger would demonstrate safer driving performance measured by driving speeds than those who

[1] For this study, we limited adult passengers to mature adult passengers on the basis of the finding that only adult passengers aged over 35 have a protective effect (Ouimet et al., 2010). Also, young drivers in this study were limited to young adult drivers in their early 20s.