



Full length article

## Designing feedback to mitigate teen distracted driving: A social norms approach



Maryam Merrikhpour, Birsen Donmez\*

University of Toronto, Department of Mechanical and Industrial Engineering, 5 King's College Road, Toronto, ON, M5S 3G8, Canada

### ARTICLE INFO

#### Keywords:

Distracted driving  
Teen drivers  
Parental norms  
Social norms  
Driver feedback  
Driving simulator

### ABSTRACT

**Objective:** The purpose of this research is to investigate teens' perceived social norms and whether providing normative information can reduce distracted driving behaviors among them.

**Background:** Parents are among the most important social referents for teens; they have significant influences on teens' driving behaviors, including distracted driving which significantly contributes to teens' crash risks. Social norms interventions have been successfully applied in various domains including driving; however, this approach is yet to be explored for mitigating driver distraction among teens.

**Method:** Forty teens completed a driving simulator experiment while performing a self-paced visual-manual secondary task in four between-subject conditions: a) social norms feedback that provided a report at the end of each drive on teens' distracted driving behavior, comparing their distraction engagement to their parent's, b) post-drive feedback that provided just the report on teens' distracted driving behavior without information on their parents, c) real-time feedback in the form of auditory warnings based on eyes off road-time, and d) no feedback as control. Questionnaires were administered to collect data on these teens' and their parents' self-reported engagement in driver distractions and the associated social norms.

**Results:** Social norms and real-time feedback conditions resulted in significantly smaller average off-road glance duration, rate of long (> 2 s) off-road glances, and standard deviation of lane position compared to no feedback. Further, social norms feedback decreased brake response time and percentage of time not looking at the road compared to no feedback. No major effect was observed for post-drive feedback. Questionnaire results suggest that teens appeared to overestimate parental norms, but no effect of feedback was found on their perceptions.

**Conclusion:** Feedback systems that leverage social norms can help mitigate driver distraction among teens. Overall, both social norms and real-time feedback induced positive driving behaviors, with social norms feedback outperforming real-time feedback.

### 1. Introduction

Distraction is a significant contributing factor in teenage-driver crashes (Ferguson, 2003; Shope and Bingham, 2008; Williams, 2003). About 20% of all crashes involving 15–18 year old drivers can be attributed to distracted driving (Curry et al., 2011). Further, in 2014, distraction contributed to 10% of 15–19-year-old drivers' fatal crashes in the U.S. (National Highway Traffic Safety Administration, 2016). While distractions have always been present in the driving environment, rapid advancement in mobile and in-vehicle technologies has made the issue ever more pronounced. It is estimated that over 90% of teenage and young drivers send text messages, and about 20% of them read emails and surf the internet while driving (AAMI, 2012; Atchley et al., 2011).

In recent years, there has been a growing interest in using

motivational techniques to change individuals' behaviors. One of the most notable techniques is the social norms approach. Social norms are “rules and standards that are understood by members of a group, and that guide and/or constrain human behavior without the force of laws” (Cialdini & Trost, 1998, p. 152). Over the past two decades, normative information has been used to target behavioral changes in various domains, such as energy consumption (e.g., Allcott, 2011), alcohol use (e.g., Haines et al., 2003), smoking (e.g., Linkenbach and Perkins, 2003), and drunk driving (e.g., Perkins et al., 2010). Individuals usually overestimate the extent to which other members of their social groups engage in or approve of unhealthy behaviors (e.g., Berkowitz, 2004; Larimer and Neighbors, 2003; Sherman et al., 1983). Individuals also tend to use their perceived norm as a point of comparison for their own behavior and a reference point from which they do not want to deviate (e.g., Baer et al., 1991; Clapp and McDonnell, 2000). Thus, interven-

\* Corresponding author.

E-mail addresses: [maryam.merrickhpour@utoronto.ca](mailto:maryam.merrickhpour@utoronto.ca) (M. Merrikhpour), [donmez@mie.utoronto.ca](mailto:donmez@mie.utoronto.ca) (B. Donmez).

tions that utilize social norms aim to reduce unhealthy behaviors, or increase healthy behaviors, through normative information to correct potential misperceptions and to provide a reference point. Although the social norms approach has been applied successfully in different domains (e.g., Allcott, 2011; Haines et al., 2003; Linkenbach and Perkins, 2003; Perkins et al., 2010), to our knowledge, it has not yet been applied to the issue of teen distracted driving. Given the important role of social norms in guiding teens' beliefs and behaviors (Forehand and Wierson, 1993; Igra and Jr, 1996), the purpose of this study is to investigate whether providing normative information can reduce distracted driving behaviors among teens. Further, we aim to evaluate whether teens misperceive social norms on driver distraction.

Parents are among the most important social referents for teens (Forehand and Wierson, 1993; Igra and Jr, 1996), and they have significant influences on teens' driving behaviors (e.g., Carney et al., 2010; Carter et al., 2014; Hartos et al., 2002; Taubman-Ben-Ari and Katz-Ben-Ami, 2012). Taubman-Ben-Ari et al. (2012) found that teen drivers, who perceived their parents to be more committed to safety and to provide more encouraging feedback for safe driving, reported driving more carefully and taking risks less frequently. Further, Carney et al. (2010) showed that parental mentoring and monitoring reduces teens' risky driving behaviors such as speeding, improper turns, and abrupt braking, and helps them learn to recognize roadway hazards. Although peers are also an important social reference group for teens (Berndt and Keefe, 1995; Kandel, 1985; Mounst and Steinberg, 1995), as an initial attempt to study social norms intervention in the context of driver distraction, this study focuses on parental norms.

In the Focus Theory of Normative Conduct, Cialdini et al. (1990, 1991) distinguish between two different types of social norms and their mechanisms in changing behavior: a) descriptive norms relate to what other people commonly do, and induce the perception that a common behavior should be the effective thing to do; b) injunctive norms relate to what other people commonly approve or disapprove and therefore motivate behavior through the promise of social sanctions. Through a phone survey with 403 teenagers between the ages of 16 and 18, Carter et al. (2014) found that teens' perception of their parents' engagement in distracted driving (descriptive norms), but not parents' approval of it (injunctive norms), was predictive of teens' self-reported engagement in distracted driving. Based on the findings from Carter et al. (2014), the social norms intervention assessed in the current study focuses on descriptive norms from parents rather than injunctive norms.

In simulator studies, Donmez et al. (2007) showed that real-time visual feedback on off-road glances results in a reduction in off-road glance frequency and Lee et al. (2002) showed that real-time auditory collision avoidance warnings reduce reaction times of distracted drivers to lead vehicle braking events. Real-time feedback aims to enhance immediate driving performance by providing information to the driver at the moment an event (e.g., driver distraction) occurs. However, any information provided to the driver in real-time would compete for resources needed for the driving task. Although real-time feedback appears to be promising for mitigating driver distraction, information related to social norms should not be provided in real-time. An alternative is to provide information post-drive or at the end of a trip. In another simulator study, Donmez et al. (2008) evaluated the effects of post-drive feedback that provided participants with information on their critical incidents (e.g., speeding, too close to lead vehicle, and lane deviation), the severity level of the incident (low, medium, or high), as well as their distraction level during the incident (low/none, medium, or high). Post-drive feedback was found to result in faster reactions to lead vehicle braking events compared to no feedback.

Roberts et al. (2012) conducted a simulator experiment to evaluate the incorporation of social norms to post-drive feedback. The post-drive feedback system, which provided drivers with a comparison of their driving behavior to that of their peers (ages 25–50), was compared to a real-time feedback system that warned drivers with visual and auditory alerts based on glance behavior. Post-drive feedback increased eyes-on-

road time and decreased unsafe off-road glances compared to no feedback, whereas real-time feedback was not found to generate such benefits (Lee et al., 2013; Roberts et al., 2012). Although these results provide evidence that a post-drive feedback system incorporating social norms information can be effective to reduce driver distraction, it is unclear which aspect of the system, i.e., summary of driving performance or comparison to peers, was effective.

The current study systematically investigates the effectiveness of incorporating parents' descriptive normative information to post-drive feedback for mitigating teens' driver distraction. Four between-subjects conditions were implemented in a simulator study: post-drive feedback incorporating descriptive normative information (or social norms feedback), post-drive feedback without normative information (or post-drive feedback), real-time feedback as it has also been shown to be effective in distraction mitigation, and no feedback as control. Questionnaires were also administered to collect data on teens' and their parents' self-reported engagement in driver distractions and the associated social norms.

## 2. Method

### 2.1. Participants

Forty teen-parent dyads completed this study. They were recruited via online advertisements, flyers posted at local universities, coffee shops, and gas stations as well as through emails sent to pools of potential participants (e.g., within universities, high schools, and driving schools). To be eligible for the experiment, teens (17–19 years) and their parent who was going to participate in the study needed to have at least a Class G2 license (allowing independent driving with restrictions) or equivalent in Ontario, Canada.

The sample consisted of seven 17-year-olds, seventeen 18-year-olds, and sixteen 19-year-olds (Table 1). The gender breakdown of the teens across the four experimental conditions was fairly balanced: social norms (6 females, 4 males), post-drive (4 females, 5 males), real-time (4 females, 6 males), and no feedback (6 females, 5 males). Overall, there were 6 father-son, 12 mother-daughter, and 22 mixed-gender (14 mother-son; 8 father-daughter) dyads.

For recruitment, we first reached out to teens and found out through them whether they had a parent who could also participate. The teens were required to come to the laboratory to drive the simulator, whereas only the parents in the social norms feedback condition were required to do so as their teens were told that the feedback they receive would reflect their parent's behavior doing the same task (as will be described later, we actually used artificial data rather than actual parental data to control for variability). The other parents were only asked to fill out an online survey. All teens were asked to come to the laboratory only after their parents completed the study (whether online or in the laboratory), and within one month after their parent's participation. Parents were not present during the teen sessions and vice versa.

It was harder to find parents who were willing to come to the laboratory than those who were willing to fill out an online survey. Thus, the first 10 teen-parent dyads who agreed to come to the laboratory were assigned to the social norms feedback condition. In

**Table 1**  
Demographic information of the teens across the four experimental conditions.

Condition	N	% male	% age group			% years of G2 licensure		
			17	18	19	≤1	> 1, ≤2	> 2
Social norms	10	40	20	50	30	10	70	20
Post-drive	9	55.6	22.3	22.3	55.6	22.3	55.6	22.3
Real-time	10	60	10	60	30	10	40	50
No feedback	11	45.5	18.2	36.4	45.4	9.1	63.6	27.3
Overall	40	50	17.5	42.5	40	12.5	57.5	30

Download English Version:

<https://daneshyari.com/en/article/4978634>

Download Persian Version:

<https://daneshyari.com/article/4978634>

[Daneshyari.com](https://daneshyari.com)