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Preliminary Research Developing a Theory of Cell Phone Distraction and Social Relationships

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Abstract

Motor vehicle crashes remain the leading cause of death and injury for people aged 5 – 34, accounting annually for over 3000 deaths, and 100 times as many injuries. It is well established that distracted driving, and cell phone use while driving in particular, pose significant crash risk to drivers. Research has demonstrated that drivers are well aware of this danger but over 90% of drivers report using a cell phone while driving. Given the likely role that social influence plays in how people use cell phones while driving surprisingly little research has been conducted investigating to whom drivers are talking or texting. We report the results of a national survey to determine who drivers are most likely to call or text when behind the wheel and compared these results with general cell phone calling and texting patterns as well as previous findings on the prevalence of calling and texting while driving. The results suggest that social distance is a key factor in cell phone use while driving: Teens are more likely to talk with parents, and adults are more likely to talk with spouses than general calling patterns would suggest. We discuss whether the purpose of calls made while driving, such as coordination, could help explain these patterns. We propose next steps for further examining the role social relationships play in cell phone use while driving to potentially reduce teen driver cell phone use by lowering the number of calls from parents.

Keywords

distracted driving; cell phone; teen driving; safety; social distance; intervention

There is an apparent disconnect between the perception of using a cell phone while driving as dangerous and the persistence of engaging in this behavior. It is well established that distracted driving, and cell phone use in particular, pose significant crash risk to drivers. Epidemiological data from the Fatality Analysis Reporting System (FARS), which includes a code for reporting cell phone use (no distinction between talking and texting) provides a

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reasonably accurate estimate of whether a cell phone was actually in use at the time of the crash. Results from 2011 indicate that at least 10% of fatal crashes (resulting in 3,331 deaths) and 17% of injury crashes (resulting in 387,000 injured) were the result of distracted driving. Of those, 12% of the distraction-related fatal crashes and 5% of distraction-related injury crashes included a driver using a cell phone. In total, 21,385 severe accidents in 2011 involved a driver who was using a cell phone. For teen drivers the rate of cell phone use in fatal crashes was considerably higher with 21% involving a driver between the ages of 15 and 19 using a cell phone (NHTSA, 2013).

A Pew survey conducted in 2009 showed that 43% of teen drivers said they had talked on a cell phone while driving and 26% of teens reported sending texts while driving (Madden & Lenhart, 2009). The Centers for Disease Control and Prevention's 2011 National Youth Risk Behavior Survey reported that 45% of teens over the age of 16 had texted while driving at least once in the past 30 days (Olsen, Shults, & Eaton, 2013). A 2012 survey of high schools students conducted by Liberty Mutual and Students Against Destructive Decisions (SADD) found that 90% of 11th and 12th grade students reported talking on a cell phone while driving and 78% reported texting while driving. Teens also reported that their parents use cell phones (91%) and text (59%) while driving (Liberty Mutual & SADD, 2012).

Data from experimental studies confirm that cell phone conversations cause inattention blindness and impair driving because drivers withdraw their attention from the road (Strayer & Johnston, 2001; Strayer, Drews, & Johnston, 2003). Further, texting while driving is associated with increased variability of speed and lane position (Narad et al., 2013; Stavrinou et al., 2013). Whether a phone is hands-free or not, drivers talking on a cell phone are four times as likely to be involved in a crash (IIHS, 2006; Brace, Young, & Reagan, 2007) and texting is no safer with a hands-free system than holding a cell phone (Owens, McLaughlin, & Sudweeks, 2011).

Recent on-road observational studies provide further opportunity for examining cell phone use and driving in a more natural setting. Instrumented vehicles recorded over 1,600 teen driver crashes (Carney, McGehee, Harland, Weiss, & Raby, 2015). Prior to these crashes, 58% of the teen drivers engaged in a distracting behavior, most commonly interacting with a passenger (15%) or using a cell phone (12%). Klauer et al. (2014) studied the relationship between cell phone use and crash risk using instrumented vehicles and found that dialing and reaching for a cell phone and sending and reading text messages significantly increased the risk of a crash or near-crash among newly-licensed teen drivers. However, Young (2015) provides an updated analysis of the 100-Car driving study that finds talking on a cell phone was not associated with increased risk of a crash (see also, Victor et al., 2015, for further analysis and discussion of this issue). While there is utility in considering the relative risk of the constituent parts of using a cell phone while driving (e.g., dialing, conversing), the research is clear that the overall act of using of a cell phone while driving compromises the safety of the driver, passengers and other road users, and that teens engaging in this behavior are at higher crash risk than adults.

Using a cell phone while driving is perceived by many drivers as socially acceptable despite the recognized dangers of distracted driving. The AAA Foundation for Traffic Safety's most

recent traffic culture survey showed strong social disapproval for using a phone while driving with 66% of respondents saying it is somewhat or completely unacceptable (AAAFTS, 2013). Many drivers believe that talking on a cell phone is dangerous and that other drivers who do this are a threat to their safety (AAAFTS, 2013; 2010). Drivers also feel that texting and emailing is more dangerous than talking on a cell phone with 92% saying it is unacceptable to text or email while driving. Despite this, 27% said they had personally texted or emailed while driving in the last 30 days and 34% said they had read a text or email while driving in the last 30 days. And among a sample of young drivers with high rates of phone use while driving the perception of risks associated with texting and driving only weakly predicted avoiding this behavior (Nelson, Atchley, & Little, 2009).

In order to understand the relationship between cell phone use and driving we need to first consider the relationship between a driver and the person they are communicating with. Normal call patterns, regardless of driving, show 30 percent of teens ages 12 – 17 who own a cell phone make calls several times a day to their friends, parents, and boyfriends/girlfriends (Lenhart, Ling, Campbell, & Purcell, 2010). The majority of teens (68%) call their parents every day while just half of these teens call friends every day. Teens report sending texts several times a day to friends (75%), boyfriends/girlfriends (40%) and parents (24%). Teens are more likely to call parents than text them and are more likely to text friends than call them. Blackman (2010) examined cell phone patterns in a sample of college students ages 18 – 21 using call logs recorded in the students' cell phones over the course of one week. Overall students called and texted their friends the most, followed by boyfriends/girlfriends, and finally parents. Similar to teens, college students were more likely to call parents than text them. However there were no differences in whether students called or texted friends and boyfriends/girlfriends. Not surprisingly, adults also call and text friends and family the most (Wajcman, Bittman, & Brown, 2008). Analysis of actual calling records indicate that 26% of calls and texts are with their friends, 18% with their spouse, 12% with their parents, and 11% with their children. Work-related contacts make up 16% of adult cell phone calls and texts.

While it may be reasonable to expect similar calling patterns whether or not a person is driving, this issue has been largely ignored. Research has shown that college students are more likely to answer a call when driving if they feel it is important (Nelson et al., 2009). Similarly, Atchley and Warden (2012) found that young adult drivers were very reluctant to delay responding, particularly to calls and texts from people to whom they are socially close. Neither of these studies provides a detailed look at who drivers are calling and texting and their social relationships. Thus, it is unknown whether calling and texting patterns vary from normal patterns during driving. Similarly, relatively little is known about who drivers communicate with while driving. As a result there is insufficient data to develop a psychological explanation about social relationships and cell phone distraction while driving. Such a theory is sorely needed to form useful, testable hypotheses and to provide a foundation for effective interventions.

We set out to describe calling patterns among both novice teen drivers and experienced adult drivers because these groups show differences in their use of cell phone technologies while driving (Madden & Lenhart, 2009; Olsen, Shults, & Eaton, 2013; Liberty Mutual & SADD,

2012), calling patterns (Lenhart, et al., 2010; Wajcman, Bittman, & Brown, 2008) and driving safety (NHTSA, 2013). As a first step we designed an exploratory study to investigate with whom teens and adults are most likely to talk and text while driving. Interviews with a small sample of drivers were used to define a short list of the most common relationships between drivers and the people with whom they talk/text. The results of the interviews informed the design of a survey administered to a national sample of teens and adults. The results from the survey showed different calling patterns while driving than are expected from general patterns of cell phone use.

Method

A mixed methods design, including in-person interviews and a survey, was used to investigate with whom drivers talked and texted while driving. Because little is known about whom they actually communicate with while driving we began with in-depth interviews exploring the patterns of texting and talking with a small sample of teens and adults. The results from the interviews were used to define a comprehensive set of appropriate questions for the larger survey.

Interviews

Semi-structured interviews were conducted to investigate how often drivers used their cell phone while driving and with whom they talked. Separate instruments were designed for teen drivers and adult drivers because driving experience was expected to impact the use of cell phones and we anticipated that teens and adults may have different social relationships and communication patterns. The goal of the interviews was to determine the prevalence of cell phone use while driving and to identify the people drivers reported talking to or texting with while driving (e.g., spouse, friend, parent).

The teen and adult interview instruments included questions about whether the driver ever used a cell phone to talk or text while driving. Drivers who reported talking or texting while driving were then prompted to describe a recent drive where they engaged in either or both of these behaviors, particularly who they were communicating with.

Participants—Thirteen teens participated in interviews. Four were learner's permit holders (age 15 to 16), five had a restricted license (age 16 to 17), and four had an unrestricted license (age 17). Five adults participated in interviews. All adults had an unrestricted license and were between 35 and 62 years of age. All participants lived in California.

Procedure—The same procedure was used for the teen and adult interviews. The interviews were conducted in individual sessions by a PhD trained psychologist. Participants provided consent (adults) or permission/assent (parents and teens) for collecting responses. Each interview session lasted approximately 1 hour. The semi-structured interviews consisted of 23 questions for teens and 18 questions for adults, including demographic and licensing questions.

The interviews were recorded, then transcribed and coded by a trained research assistant. For each participant the research assistant categorized whom teens and adults were most likely to talk and text with while driving. These categories were reviewed by a second researcher. There were no disagreements on these categories.

Survey

Based on the results of the interviews a survey was developed to further explore with whom drivers talk and text while driving. The survey was part of a larger research project and included additional questions exploring driving behavior and attitudes. This paper examines the subset of questions about whether drivers use a cell phone while driving to talk or text and who they are most likely to talk or text with. Teens and adults received slightly different versions of these questions.

These questions included:

1. Who are you most likely to talk to on your cell phone when you are driving?

- Friend
- Girlfriend/Boyfriend (Teen) or Spouse (Adult)
- Parent
- Child (Adults only)
- Boss or someone at work
- Other: _____

2. Who are you most likely to text when you are driving?

- Friend
- Girlfriend/Boyfriend (Teen) or Spouse (Adult)
- Parent
- Child (Adults only)
- Boss or someone at work
- Other: _____

Participants—A total of 471 respondents from 31 states participated in the survey. An online survey panel company distributed the survey to a convenience sample of adults on existing survey panels. Teen participants were recruited through their parents who were members of the adult panels. Parents and teens provided permission/assent for collecting responses. The panel company monitored and tracked the responses, and only respondents who completed the entire survey and met all the inclusion criteria were included in the dataset. Table 1 lists the number of respondents in each age and licensure category.

Procedure—The survey was distributed online by a panel service company. It included 15 questions and took approximately 10 minutes to complete.

Results

Interviews

Participant responses were reviewed to identify categories for use in the survey questions. Because of the small sample sizes these results were of value mainly for informing the survey design and so are only described briefly. Teens with learner's permits reported that they never talked or texted while driving, while teens and adults in all other groups indicated that they use their cell phones for talking and texting while driving. Teens with restricted and unrestricted licenses reported that most of their calls and texts were with parents, friends, boyfriends and girlfriends. The majority of teens reported calls to or from their parents and texts to or from their friends, although some teens described making and receiving work-related calls. Teens reported that parents like to know where they are, frequently make "check-in" cell phone calls, and may continue to call until the teen answers. Adults indicated that they call and text friends, children, spouses, other family and work.

Survey

The results from the survey showed that teens in every license category reported talking on their cell phone while driving (see Table 2).

Teens with learner's permits show the lowest overall rates of talking on the cell phone with just 57% using a cell phone while driving. This increases with experience such that 90% of 18-year-olds reported using a cell phone while driving. The majority of teens reported that they are most likely to talk to a parent while driving, with fewer teens reporting they are most likely to talk with a friend or girlfriend/boyfriend while driving.

A chi square analysis compared the patterns of calling while driving from the survey with calling patterns reported in previous research (Lenhart et al., 2010). Since the only teens who reported work-related calls while driving were in the 18-year-old category and this category did not occur in previous studies about teen cell phone use patterns, it category was not included in the analyses. The remaining categories were assumed to have proportions as shown in Table 2. For each of the age and license groups an overall chi-square was performed. The overall chi-square tests indicated that reported patterns in who teens talked with while driving were significantly different from the proportions observed in previous studies.

Additional comparisons were made between the friend and parent categories (see Table 3). There were two patterns among the teens that were unexpected. First, the proportion of teens who did not talk while driving was greater than that reported in previous research. This may indicate that our sample was biased in favor of teens who choose not to use a phone while driving, that the teens had a response bias against admitting that they use a phone while driving, or that teens were more likely to text than talk while driving. Second, teens were more likely to talk with parents than friends while driving when compared to their general calling patterns. The only exception was teens with unrestricted licenses ages 16–17 who were equally likely to talk to parents and friends.

Adults reported that they are most likely to talk to their spouse while driving and are much less likely to speak with friends or their children (see Table 4). These calling patterns were compared with those reported in previous research (see Table 4).

The overall chi-square test was significant, $X^2 = (5, 76) 58.03, p < .001$, indicating that adults did not make calls while driving in the same proportions as general calls. A post-hoc comparison between calls to friends and spouses, $X^2 = (1, 32) 10.26, p = .001$, showed that adults had significantly more calls than expected with their spouse than with friends while driving.

Fewer teens reported texting than talking while driving. As with talking on a cell phone when driving, teens with newer licenses were less likely to engage in texting but this behavior increased with age and experience. The majority of teens said they are most likely to text with a friend rather than a girlfriend/boyfriend or parent (see Table 5). For comparison, texting patterns reported in previous research are shown as well (Table 5).

The overall chi-square tests indicated that for drivers younger than 18 the reported texting patterns while driving were significantly different from those reported for teen texting in general (see Table 6). Post-hoc comparisons between the friend and parent categories did not show any significant differences from the expected patterns for texting, with teens reporting texting their friends more frequently than their parents.

Adults reported the lowest rates of texting while driving. Adults said they are most likely to text a friend or child (see Table 7). For comparison proportions reported in previous research are also provided.

The overall chi-square test was significant, $X^2 = (5, N=76) = 59.56, p < .001$, indicating that the reported texting patterns while driving were different from the expected ones. Overall adults reported texting less frequently in the survey than expected. A follow-up test showed that the observed proportions for texting with friends and spouses were not different from the hypothesized proportions, although there were only five cases.

Discussion

Using a cell phone to communicate is a social behavior. Using a cell phone while driving also has important safety implications, particularly among teen drivers (NHTSA, 2013). Previous research shows that the social distance between the driver and person when whom they are talking/texting is a strong predictor of cell phone use while driving. Despite the connections between social relationships and decisions to use a cell phone while driving this study is the first to examine with whom teens and adults talk and text while driving.

General cell phone use includes many interactions with friends, family members and work. However, cell phone interactions while driving seem to be focused on communicating with only the people closest to the driver. Our results indicate that social relationships are a key factor in who drivers talk and text with while driving. Teens had significantly more calls with their parents while driving and adults had significantly more calls with their spouses while driving than expected from general calling patterns. This is consistent with previous

research showing that a closer social distance between a driver and the person they are communicating with may increase the likelihood of responding to a text while driving (Atchley & Warden, 2012).

Both teen and adult drivers reported that they are most likely to talk to the people who are socially closest to them suggesting that the same underlying mechanism is responsible for teens and adults talking while driving despite the different patterns of calling. Perhaps in an effort to compensate for the possible risk of using a cell phone drivers choose to only take the most important calls. Or they are unwilling to ignore a call from a parent or spouse because of its perceived importance, the social cost for ignoring it, or because the parent or spouse will continue to call until they answer.

An alternate hypothesis is that the purpose of calls while driving is mainly for coordinating or checking in. This is also consistent with the unexpectedly high number of calls between parents and teens and adults and spouses. Adults rated coordination and planning, particularly arranging to meet other family members, as a significant reason to use a cell phone in general. Finding out the location of their children was rated as important by more than half of parents (Wajcman et al., 2008). This may be particularly true when children are teen drivers.

A better understanding of the purpose of calls and texts while driving will improve efforts to reduce this behavior. For example, reducing check-in calls/texts may require different solutions than reducing social calls/texts. In order to distinguish between these possibilities additional research is needed using call logs including who initiated each call, the duration of the call, and self-reports of the content of the calls (e.g., coordination, socializing).

An important implication of the larger than expected number of calls between teen drivers and their parents is the direct involvement of parents in this dangerous behavior. This indicates that efforts to reduce teen cell phone use while driving must include parents as well as teens (LaVoie, Lee, & Parker, 2014). If parents stopped talking with teen drivers it could reduce teen driver cell phone distraction by as much as half. During the interviews we conducted teens described receiving phone calls from their parents. Although the sample size was very small, it is interesting to note that some teens had parents who were sensitive to the dangers of talking on the phone while driving. These parents encouraged the teens to pull over before calling them back. Other teens explained that their parents would continue talking to them even when they said they were driving. What is not clear, and certainly bears further investigation, is whether parents would be less likely to expect their teen to answer or would be more likely to keep phone calls short if the parent knew the teen was driving. A more detailed analysis of calls and texts among teens and their parents, including the frequency, timing and duration, would improve our understanding of these behaviors. Allowing teens to focus only on driving, rather than handling cell phone calls or social relationships, could have a substantial influence on reducing teen crash rates. Considering the relatively greater risk of texting while driving, reducing the number or frequency of parent texts received while driving would likewise improve teen driver safety.

This study has several limitations. First, the results are based on self-reports rather than actual call logs, and thus calling patterns may not be completely accurate. Some of the differences between expected and reported calling frequencies could be errors in recall or bias in participant self-reports. Second, we do not have information about who initiated the calls or what the calls were about. This makes it difficult to determine the contribution of social distance and call purpose in the unique calling patterns that were found. Third, participants were not asked about strategies for mitigating risk, such as pulling over to take a call or asking a passenger to handle a call. Finally, there is no way of knowing whether both parties were aware that someone was driving during calls and texts which could reasonably be expected to alter behavior.

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Highlights

- We conducted a national survey with teen and adult drivers about who they talk or text on their cell phone while driving.
- Teen drivers are more likely to talk with their parents and adult drivers are more likely to talk with their spouse when compared to general cell phone calling patterns.
- Drivers receive the most texts and calls from people they are socially close to while driving.
- Additional research is needed to determine if driver cell phone call patterns are influenced more by social distance or purpose, such as coordination.

Table 1

Number of Survey Respondents by Age and License Stage

Age	License	Gender	Total
15	Learner's permit	M 31, F 34	65
16	Learner's permit	M 33, F 32	65
15	Restricted license	M 3, F 0	3
16	Restricted license	M 42, F 49	91
17	Restricted license	M 8, F 16	24
16	Unrestricted license	M 24, F 17	41
17	Unrestricted license	M 17, F 19	36
18	Unrestricted license	M 20, F 50	70
40–60	Unrestricted license	M 37, F 39	76

Table 2

Who Teen Drivers Talk to While Driving by License Stage, Observed and Predicted

	License	Age	Friend	Parent	Girlfriend/Boyfriend	Work	Do not talk
Observed	Leamer's Permit	15–16	15%	32%	10%	0%	43%
Observed	Restricted	15–17	22%	37%	7%	0%	34%
Observed	Unrestricted	16–17	19%	31%	21%	0%	29%
Observed	Unrestricted	18	21%	50%	16%	3%	10%
Predicted		Teen	30% ¹	30% ¹	30% ¹	0%	10% ²

¹Lenhart, Ling, Campbell & Purcell, 2010

²Liberty Mutual & SADD, 2012

Table 3

Chi Square for teens in each age and license groups frequency of calling while driving

License	Age	Overall chi-square	Friend vs. Parent
Learner's Permit	15–16	(3, N=130) = 168.92, $p < .001$	(1, N=61) = 7.23, $p = .007$
Restricted	15–17	(3, N=118) = 93.19, $p < .001$	(1, N=70) = 4.63, $p = .031$
Unrestricted	16–17	(3, N=77) = 31.62, $p < .001$	(1, N=39) = 2.08, $p = .150$
Unrestricted	18	(3, N=68) = 16.22, $p = .001$	(1, N=50) = 8.00, $p = .005$

Table 4
Who Adult Drivers Talk to While Driving by License Stage, Observed and Predicted

	License	Age	Friend	Child	Parent	Spouse	Work	Do not talk
Observed	Unrestricted	51.6 (avg)	13%	12%	7%	29%	6%	33%
Predicted		Adult	26% ¹	15% ¹	15% ¹	18% ¹	16% ¹	10% ²

¹Wajcman, Bittman, & Brown, 2008

²Liberty Mutual & SADD, 2012

Table 5

Who Teen Drivers Text While Driving by License Stage, Observed and Predicted

	License	Age	Friend	Parent	Girlfriend/Boyfriend	Work	Do not text
Observed	Leamer's Permit	15–16	27%	8%	8%	0%	57%
Observed	Restricted	15–17	25%	8%	10%	0%	57%
Observed	Unrestricted	16–17	33%	6%	18%	0%	43%
Observed	Unrestricted	18	27%	16%	30%	1%	26%
Predicted		Teen	42% ¹	13.5% ¹	22.5% ¹	0%	22% ²

¹Lenhart, Ling, Campbell & Purcell, 2010

²Liberty Mutual & SADD, 2012

Table 6

Chi Square for teens in each age and license groups frequency of texting while driving

License	Age	Overall chi-square
Learner's Permit	15–16	(3, N=130) = 95.75, $p < .001$
Restricted	15–17	(3, N=118) = 83.59, $p < .001$
Unrestricted	16–17	(3, N=77) = 20.33, $p < .001$
Unrestricted	18	(3, N=69) = 6.20, $p = .102$

Table 7

Survey: Who Adult Drivers Report Texting While Driving by License Stage

License	License	Age	Friend	Child	Parent	Spouse	Work	Do not text
Observed	Unrestricted	51.6 (avg)	6%	5%	1%	1%	3%	84%
Predicted		Adult	17% ¹	10% ¹	10% ¹	12% ¹	10% ¹	41% ²

¹Wajcman, Bittman, & Brown, 2008

²Liberty Mutual & SADD, 2012