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Teen Drivers' Perceptions of Inattention and Cell Phone Use While Driving

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Abstract

Objective—Inattention to the roadway, including cell phone use while driving (cell phone calls, sending and reading texts, mobile app use and internet use), is a critical problem for teen drivers and increases risk for crashes. Effective behavioral interventions for teens are needed in order to decrease teen driver inattention related to cell phone use while driving. However, teens' perceptions of mobile device use while driving is a necessary component for theoretically driven behavior change interventions. The purpose of this study was to describe teen drivers' perceptions of cell phone use while driving in order to inform future interventions to reduce risky driving.

Methods—We conducted seven focus groups with a total of 30 teen drivers, ages 16–18, licensed for ≤1 year in Pennsylvania. The focus group interview guide and analysis were based on the Theory of Planned Behavior, identifying the attitudes, perceived behavioral control, and norms about inattention to the roadway. Directed descriptive content analysis was used to analyze the focus group interviews. All focus groups were coded by two research team members and discrepancies were reconciled. Themes were developed based on the data.

Results—Teens had a mean age of 17.39 (sd 0.52), mean length of licensure of 173.7 days (sd 109.2; range 4–364), were 50% male and predominately white (90%) and non-Hispanic (97%). From the focus group data, three major themes emerged; (1) Recognizing the danger but still engaging; (2) Considering context; and (3) Formulating safer behaviors that might reduce risk. In spite of recognizing hand-held cell phone use, texting and social media app use are dangerous and distracting while driving, teens and their peers often engage in these behaviors. Teens described how the context of the situation contributed to whether a teen would place or answer a call, write or respond to a text, or use a social media app. Teens identified ways in which they controlled their behaviors, although some still drew attention away from the roadway.

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Conclusions—Cell phone use while driving is a contributor to motor vehicle crashes in teens and effective interventions to decrease risks are needed. Teens viewed some types of cell phone use as unsafe and describe methods in which they control their behaviors. However, some of their methods still take attention off the primary task of driving. Teens could benefit from behavior change interventions that propose strategies to promote focused attention on the roadway at all times during the driving trip.

Keywords

Cell phone; Distracted driving; Inattention; Motor vehicle crashes; Teen driving; Texting; Theory of Planned Behavior

INTRODUCTION

Motor vehicle crashes are the leading cause of morbidity and mortality in teens.[1] Even as overall crash rates decline, [2,3] risky driving behaviors persist in teens. Risky driving includes cell phone use and texting while driving, drowsy driving, drinking and driving, and speeding.[4–6] Risky driving of particular concern for teen drivers is driver inattention, or the insufficient attention to activities critical for safe driving.[7] Inattention results from recognition errors, inadequate surveillance, and distractions inside the vehicle.[8,9] Cell phone use while driving including phone calls, sending and reading texts, app use (such as Twitter©, Snapchat©, Instagram©) and internet use all contribute to teen driver inattention.

The Centers for Disease Control 2011 National Youth Risk Behavior Survey indicates that almost 45% of teen respondents reported texting while driving in the previous 30 days.[10] The Pew Research Center indicates that 52% of cell phone-owning teens ages 16–17 have talked on a phone while driving; 48% of all teens ages 12–17 say they have been in a car when the driver was texting; and 40% say they have been in a car when the driver used a cell phone in a way that put themselves or others in danger.[11] Cell phone use while driving is related to teen driver crashes.[12] Klauer and colleagues[13] found that the risk of crash or near crash among novice drivers increased if they were reaching for or dialing a cell phone (OR= 7.05, 95% CI 2.64–18.83) or sending or receiving text messages (OR=3.87, 95% CI 1.62–9.25). Distracted driving contributes to over 3000 crashes (all driver) and 11% of drivers age 15–19 involved in fatal crashes were distracted at the time of the crash.[14]

Policies in the United States restricting cell phone use while driving have not consistently shown to be effective in changing teen driver behaviors or reducing teen driver crashes.[15,16] Effective behavioral interventions for teen drivers (i.e. programs that can help teens change their actions as a driver) are needed in order to decrease teen driver inattention related to cell phone use while driving, and in turn, crash risk. Other teen health behaviors such as risky sexual behaviors and alcohol use have shown to be modifiable through targeted interventions based on behavior change theory[17–19] such as the Theory of Planned Behavior (TPB).[20,21] However, TPB has not been applied to intervention development for cell phone use by teen drivers. Teens' perceptions of cell phone use while driving is a necessary component of behavior change interventions. Therefore, the purpose of this study was to

describe teen drivers' perceptions of cell phone use while driving. Ultimately, these results will inform future interventions to reduce risky driving in teens.

METHODS

We conducted focus groups with teen drivers, ages 16–18, licensed for ≤1 year in Pennsylvania to elicit their attitudes, perceived behavioral control, and subjective norms about inattention to the roadway. Focus group methodology was chosen as the qualitative method for this study because it provided the opportunity to collect descriptive data from teens through group interaction about their perceptions of inattention to the roadway.[22] The focus group interview guide and analysis were based on the Theory of Planned Behavior (TPB),[20,21] which posits that the attitude toward a behavior, perceived behavioral control, norms and intentions shape behavioral intentions and the actual behavior. In this study, we use the TPB in the context of teen driving behaviors (see Figure 1) and focused on attitudes, perceived behavioral control and subjective norms of the teens. While the TPB has been applied to predict driving behaviors such as talking on the cell phone while driving,[23,24] texting and driving,[25,26] and seatbelt use and speeding;[27] there is a gap in the literature with testing a TPB intervention to reduce teen driving inattention. Therefore, the use of focus group methods is a logical strategy for us to understand the perceptions and experiences of inattention to the roadway, and ultimately, to develop and test an intervention to improve attention to the roadway (see Table 1).

The focus group interview guide included open-ended questions and probes to examine teens' perceptions of inattention and cell phone use while driving (e.g. talking on the cell phone, texting, use of cell phones to access the internet and apps). These questions and probes were developed based on the theoretical constructs of attitudes, perceived behavioral control, and subjective norms in TPB. Ajzen (1991)[20] posits that attitudes are the degree to which someone has a favorable or unfavorable evaluation of the behavior; perceived behavioral control is the perceived ease or difficulty in performing a behavior; subjective norms are the perceived social pressure to perform or not perform a behavior.

Drawing from these theoretical constructs in TPB, (attitudes, perceived behavioral control and norms), we then included questions in the focus group guide such as: "*What do you think about teens texting (talking on a cell phone/using a mobile device to access the internet) while driving?*" (Attitudes); "*What are some good (bad) things about texting and driving?*" (Attitudes); *"What makes it easy (hard) to text and drive?" (*Perceived behavioral control*); "Who approves (disapproves) of you texting (talking on a cell phone, using a mobile device to access the internet) while driving?"* (Norms) and "*Are there certain apps or programs that teens use more often while driving?*" (Norms).

Audio-taped focus group responses were transcribed and checked for accuracy. Directed descriptive content analysis[28] was used to analyze the focus group interviews. Based on TPB and the empirical literature, key concepts of attitudes, perceived behavioral control and subjective norms were identified as coding categories for different types of cell phone use (e.g. texting, calls and social media apps); definitions based on the TPB and the empirical literature were developed for the coding categories.[28] Table 1 provides example coding

categories and definitions. These coding categories and definitions were used by research team members to analyze the transcripts. Transcripts were reviewed by research team members in Atlas.ti (version 7.5) to apply coding categories to the sections of text (participant's quotes). Coding categories and definitions were refined after the first two transcripts were analyzed; additional categories were added that were not previously identified by the theoretical framework or empirical literature. All focus groups were coded by the same two research team members and discrepancies were reconciled. The two research team members had 81% congruence prior to reconciliation. Themes were developed based on the participants' data that illustrated the coding categories. Self-reported demographic data were double data entered in SPSS and frequencies were used to describe the sample.

The purposive sample of teens was recruited through primary care clinics, flyers, email and word of mouth. Purposive samples are often used in focus group research because of their experience with the phenomenon of interest (here, inattention to the roadway);[29] thus our recruitment of licensed teens. We chose to include newly licensed teens up to a year because teens could describe not only their experiences as drivers, but also those of their peers or what they perceived as behaviors of other teens. Participants provided written assent (under age 18 years) or consent (age 18 years). Verbal parental consent was obtained for teens under age 18. Focus groups took place in a private room in a community center, lasted 60–90 minutes and were facilitated by the principal investigator (PI) with at least one other research assistant taking notes. Self-report quantitative demographic data were collected prior to the start of the focus group. Participants used celebrity names as pseudonyms during the focus group. Focus group data collection was completed when preliminary analysis indicated saturation had been reached (e.g. no new codes or themes were developed). Study procedures were approved by the institutional review board at the University of Pennsylvania with an administrative agreement with The Children's Hospital of Philadelphia.

RESULTS

A total of 30 teens participated in the 7 focus groups, with attendance ranging from 3–6 participants (median=4) in each group. Table 2 outlines the demographic characteristics of our sample. The teens were licensed with a range of 4–364 days (IQR: 75–247). From the focus group data, three major themes emerged; (1) Recognizing the danger but still engaging; (2) Considering context; and (3) Formulating safer behaviors that might reduce risk. We discuss the themes and use exemplar quotes to illustrate the themes.

Theme 1: Recognizing the Danger but Still Engaging

In spite of recognizing that when driving, hand-held cell phone use, texting and social media app use (e.g. Twitter©) are dangerous and distracting, teens described that they and their peers often engage in these behaviors while driving. Some teens in the focus groups indicated that they never used a cell phone while driving. However many teens described that they and a majority of friends engage in texting and social media app use while driving. Teens offered reasons as to why they and other teens engaged with their cell phones while

driving and also differentiated between the relative dangers of texting, app use and talking on the cell phone while driving.

In recognition of the dangers of texting and app use while driving, teens discussed how the use of technology takes their eyes off the road, as well as causing competition with attention for the driving task. However, not all teens defined texting while driving systematically; some teens did not consider reading a text or engaging with a text message while the vehicle was stopped (e.g. at a red light) as texting while driving. In response to questions about texting, a teen responded:

> "I also think it is pretty bad to text and drive. I mean it takes a couple seconds to punch in a couple letters, the roadways always change really quick, especially on the highway or if the weather is really raining. Somebody could jam on their brakes and you would not see it." (Boy A, age 18)

Even though teens describe it as dangerous, some teens and their friends still engaged in texting and driving, offering explanations about their driving skill, need for constant communication stimulation, and the importance of the text as rationalizations for why teens still text and drive even if they know it is dangerous.

> "I think most teenagers do think it is unsafe. They think we can do it anyway, I guess. We are good enough drivers or whatever. We can get away with it." (Boy B, age 17)

The pervasiveness of constant connectivity to which teens are accustomed and need to instantly respond to messages played a strong role in discussions. They viewed constant connectivity in the form of texting and social media apps as the normative teen behavior. Some noted that teens may have a difficult time differentiating between how they text within and outside the driving experience; teens do so much communicating via text messaging that for some, it may just seem natural to read, send and respond to texts while driving. The paradox of knowledge of the danger and the continued willingness to engage in the cell phone use while driving was apparent.

> "I think it is because teens are just so obsessed with social media and texting and just always being on their phones at all times. I think it is just like hard for teens our age to like, we are teens, but, to put that down and actually focus on the road and not be touching your phone all the time." (Girl C, age 17)

> "I think that is, when people get their license, it just becomes part of their everyday lives and just as texting is a part of your everyday life that you kind of, they integrate like unintentionally and it is not a conscious decision, it just kind of happens." (Boy D, age 17)

Teens also described talking on a hand-held cell-phone as dangerous, but they viewed hands-free phone calls as safer because they are similar in nature to conversing with a passenger.

> "And I feel like that (hands-free cell phone) is safe. I feel like that is as safe as if I was driving with a passenger who is talking while I am driving." (Boy E, age 17)

As teens have moved to using more texting and less phone calling for communication, they viewed a phone call as an urgent situation as compared to a text. Calls were often reserved for “emergencies” or when parents were calling.

> “For me, if a teenager is calling me, that is pretty rare. I would think it is important so I would pick it up.” (Boy B, age 17)

The use of hands-free device use ranged from using speakerphone to blue tooth devices through vehicles. Some teens remarked, however, that often teens do not have blue tooth capabilities and therefore use speakerphone options. A few teens recognized the influence that cell phone conversations can have on attention to the road, even if they use a hands-free device. They talked about the competing cognitive demands of trying to carry out a conversation while also trying to manage driving. As one teen noted:

> “Well, you’re also thinking in two different places because you’re thinking of the road, but you’re also thinking of your conversation, and what you’re talking to this person about. So you can’t have your entire thought process on the road and on what to do if something bad arises.” (Girl F, age 17)

Theme 2: Considering Context

Teens described how the context of the situation contributed to whether a teen would place or answer a call, or write or respond to a text or use a social media app. The nature of the relationship to the other person engaged in the call, text or app use; the purpose of communication; and external factors like weather, road familiarity and traffic patterns all contributed to decisions.

The relationship of the other participant engaged in the call, text or app affected the teen’s response to the communication. For example, communication with a close friend, significant other, or parent would increase the likelihood of using the phone while driving. In addition, if teens thought the call, text or app notification was relevant to their trip (e.g. a friend who they plan to see texts them), then it would contribute to their decision to engage with the cell phone.

> “If it’s something more important to me. Like, if it’s a close friend or someone who is texting me, or a boyfriend, then I’m more likely to respond than if it’s like some obscure person who’s just like saying, hey...” (Girl F, age 17)

> “If I am going to meet my friends somewhere or if I am going to their house and I get a text from them, I am much more inclined to read it and open it while I am driving because it might be something I need to know before I get there.” (Girl G, age 18)

Teens indicated that most parents would disapprove of cell phone use while driving. However, if a parent called or texted, the teens would respond.

> “More often than not, it is my parents calling, wondering where I am and stuff like that. They are checking up on me all the time. I see them do that a lot. They are usually the ones calling.” (Girl H, age 17)

> "If it is like a parent calling me, I will take the phone and put it up on the wheel or something. Like right here. Just see who it is. If it is someone I do not know or if it is somebody I do not care to talk to right now, I put it right back in the cup holder. But if it is my parents, then I will just answer it and then because I usually have it plugged into the audio, it will just come through my car." (Boy I, age 16)

Teens recognized that external factors like weather, and familiarity with roads and traffic affected their usage patterns. For example weather such as rain or ice served as a deterrent to texting. Teens described that when they were more familiar with roads, they would use their cell phone while driving. Likewise, highways or roads where speed limits were high where considered unsafe places to use a cell phone while driving.

> "You are not going to text when you are going 80 miles an hour down the highway. You are going to look at if you are driving 10 miles an hour down your street." (Girl J, age 17)

Theme 3: Formulating Safer Behaviors That Might Reduce Risk

Teens described a number of methods to avoid using cell phones while driving. These included turning the phones off, putting them out of reach (e.g. in purse in the back seat), on vibrate or on silent

> "I like to put my phone in my purse and I keep it on vibrate so if it is in my purse on the floor in the passenger seat, I literally cannot hear it. I cannot reach it. I cannot get it out. So even if someone were to call, I would not be able to hear it." (Girl G, age 18)

The strategy of having the phone off or on silent removed the decision of whether or not to respond to a visual or audio notification. One teen described keeping notifications turned on, but would not answer until she got to her destination. She noted that once there, looking at and answering the messages served as a reward-like a bonus. Teens also described pulling over to the side of the road to answer calls or texts. Sometimes, however, their strategies still exposed them to risk by removing their attention from the roadway. For example, participants viewed that when they were stopped at a traffic signal, they were "safer" to use the cell phone. Some did not consider cell phone use at a stoplight as texting and driving. For example:

> "I think stoplights…Because you tend to be stopped at them for long periods of time, much longer than a stop sign usually…like a red light, if there are three or four cars in front of you, you might say oh I am not even getting through this light anyway. I might as well just take a look or something like that." (Boy K, age 18)

> "If I need to make a call, I usually dial the number at a red light, and I put it on speaker phone. I personally prefer, if I'm in the car, if I need to talk to someone. The only time that I really text someone in the car if I really need for them to know what's going on. That's usually at red lights. I usually make a call instead of texting, because I just feel like that's more. I'm less distracted because I'm looking at like the phone the whole time." (Girl F, age 17)

DISCUSSION

We identified three themes from the focus group data from novice teen drivers which reinforce the pervasive nature of connectivity among today's youth, and their attempts to create rules about safer behaviors for themselves. The teen norm of technological connectivity is likely to endure. Our data suggest that successful interventions that incorporate connectivity and context for teen drivers are more likely to be successful than those that do not consider those aspects of teen driving. Teens recommended several strategies that would reduce the risk of traffic crashes and could be incorporated into behavioral interventions.

Teens emphasized the critical role of parents and noted the urgency to respond to parental communications. Parents need to communicate clear expectations, possibly through a driving agreement[30] with their teen that covers situations when the parent calls or texts the teen during driving. A driving agreement negotiated by teens and parents might stress expectations of teen communication prior to driving, that a teen does not answer a parental phone call or text while driving and when the teen reaches the destination, s/he responds to the parent with an explanation s/he was driving. In addition, given that teens whose parents engaged in distracted driving behaviors are more likely to engage in distracted driving behaviors themselves,[31] parental modeling of safe driving behaviors and normative parental expectations is also needed.

The focus group data highlight how addressing attitudes, perceived behavioral control and norms may contribute to intervention development. Teens described turning off the cell phone, silencing and pulling over to the side of the road as strategies to manage cell phone use while driving. The delayed gratification involved in these behaviors is challenging for teens, who have competing maturation in social-emotional and cognitive-control networks.[32,33] However, strategies that can bolster positive attitudes about not using the phone, increase the ease at which they can refrain from using mobile technology, and decrease the social pressure to use their phone may be effective.

Some "safe behaviors" recommended by the teens may place them at risk, but also show a conscious effort to manage the danger of inattention. For example, texting or answering calls at stoplights for newly licensed drivers takes attention away from the roadway, thereby impeding their ability to integrate environmental cues with complex driving scenarios.[9] The willingness to discuss alternative behaviors that reduce risk, however, presents a teachable moment that can lead to behavioral change toward safer driving practices.[34] The potential for behavioral change has been addressed in other risky situations with teens with varying degrees of success such as smoking,[35] alcohol use,[36] and unsafe sex;[37,38] inattention to the roadway by teen drivers is a logical focus for developing and testing behavioral interventions.

To move this work forward, scientists working in the area need to develop systematic definitions of cell phone use related to texting (texting-reading, writing, responding) and social media app use is needed. Teens in our sample did not have universal definitions for texting while driving. When nationally representative surveys are administered that include

questions related to cell phone use and driving,[10,11] we encourage precise language around reading, writing, responding and at what points in the driving trip this activity occurs (e.g. at stop lights, while the car is in motion, etc.). Once common language and definitions exist, systematic programs to reduce driving risk are more likely to be generalizable.

Limitations

This study was a small sample of predominately white, non-Hispanic teens from Pennsylvania. Therefore, the findings may be limited in generalizability. The optimal size for focus groups is 6–10 participants.[22] Given scheduling difficulties of the teens who expressed interest in our study, we conducted groups with a minimum of three participants. We found that by focus group number 7, preliminary analysis with the data indicated saturation was reached, with no new codes or themes emerging from the data. Therefore we completed the focus group data collection after 7 groups and 30 teens. Although the sample was 50% male, 50% female, we were not able to make comparisons between the female and male teens. Although we had a range of licensure of 4–364 days, subgroup analysis based on length of licensure was not possible.

Conclusions

Cell phone use while driving is a contributor to teen crashes and effective interventions to decrease risks are needed. Teens view some types of cell phone use, such as texting and driving, as unsafe but still describe engaging in these behaviors. They also identify methods to control their behaviors; however, some teens persist in using technology while driving, which takes attention away from the primary task. Teens could benefit from behavior change interventions that propose strategies to promote focused attention on the roadway at all times during the driving trip. These interventions would provide teens with the tools to avoid using a cell phone for communication while driving and allow for a safe arrival at the destination.

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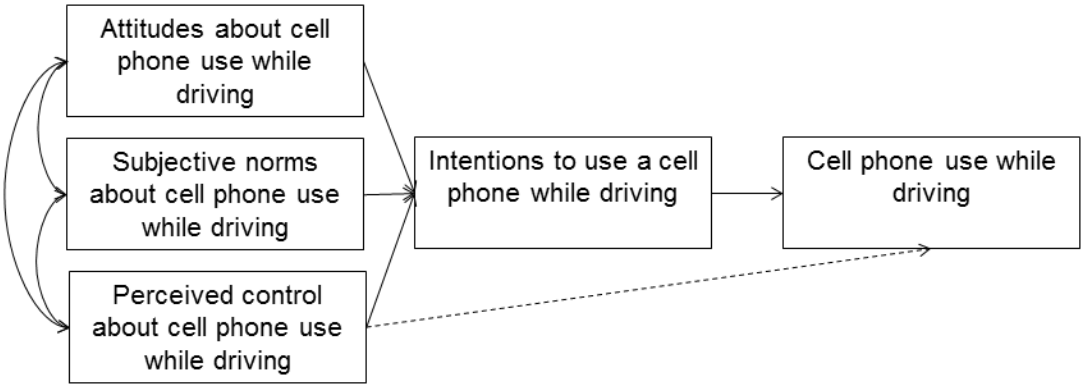

Figure 1.
Theory of Planned Behavior for Cell Phone Use while Driving
Note: Adapted from Ajzen, 1991

Table 1

Example Coding Categories and Definitions

Coding Category	Definition for this study
Attitudes about Inattention with Cell Phone Calls	Degree to which the teen has a likable or unlikable evaluation or estimation of inattention related to cell phone calls while driving.
Perceived Behavior Control for Inattention with Cell Phone Calls	Feeling that the teen can control and perceive the consequence of their inattention-related to cell phone calls while driving.
Perceived Norms for Inattention with Cell Phone Calls	Normative expectation of others related to inattention and cell phone calls.

Table 2

Demographic Characteristics

	Mean (sd) or % (n)
Age	17.39 (0.52)
Gender	
Male	50% (15)
Female	50% (15)
Race	
White	90% (27)
Asian/Pacific Islander	3% (1)
Not reported	7% (2)
Ethnicity	
Hispanic	3% (1)
Non-Hispanic	97% (29)
Length of licensure (days)	173.7 (109.2)