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Social Norms and Risk Perception: Predictors of Distracted Driving Behavior Among Novice Adolescent Drivers

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Abstract

Purpose: Adolescent drivers are at elevated crash risk due to distracted driving behavior (DDB). Understanding parental and peer influences on adolescent DDB may aid future efforts to decrease crash risk. We examined the influence of risk perception, sensation seeking, as well as descriptive and injunctive social norms on adolescent DDB using the theory of normative social behavior.

Methods: 403 adolescents (aged 16–18 years) and their parents were surveyed by telephone. Survey instruments measured self-reported sociodemographics, DDB, sensation seeking, risk perception, descriptive norms (perceived parent DDB, parent self-reported DDB, and perceived peer DDB), and injunctive norms (parent approval of DDB and peer approval of DDB). Hierarchical multiple linear regression was used to predict the influence of descriptive and injunctive social norms, risk perception, and sensation seeking on adolescent DDB.

Results: 92% of adolescents reported regularly engaging in DDB. Adolescents perceived that their parents and peers participated in DDB more frequently than themselves. Adolescent risk perception, parent DDB, perceived parent DDB, and perceived peer DDB were predictive of adolescent DDB in the regression model, but parent approval and peer approval of DDB were not predictive. Risk perception and parental DDB were stronger predictors among males, whereas perceived parental DDB was stronger for female adolescents.

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Conclusions: Adolescent risk perception and descriptive norms are important predictors of adolescent distracted driving. More study is needed to understand the role of injunctive normative influences on adolescent DDB. Effective public health interventions should address parental role modeling, parental monitoring of adolescent driving, and social marketing techniques that correct misconceptions of norms related to around driver distraction and crash risk.

Keywords

Motor vehicle crash; Adolescents; Distracted driving

Motor vehicle crashes are the leading cause of death and a leading cause of nonfatal injury among adolescents aged 16–20 years [1,2]. Adolescent drivers are three times more likely than drivers over the age of 20 to be in a fatal crash and have the highest crash risk per mile driven of all age groups apart from the most elderly drivers [1]. This elevated crash risk, which is highest during the first 6 months of licensure [3], has been attributed to several adolescent-specific risk factors, including immaturity and developmental characteristics such as heightened impulsivity and sensation-seeking behavior [4–6], a lack of driving skills, exposure to higher risk adolescent driving environments (e.g., driving at night or with adolescent passengers), risk-taking behavior (e.g., impaired driving and seatbelt nonuse), and greater willingness to engage in DDBs [7–13]. The rapid proliferation of interactive mobile technologies, in addition to other distractions, has increased the need to understand DDBs and their role in adolescents' elevated crash risk.

Driver distraction results from secondary activities that disrupt the visual, auditory, biomechanical, or cognitive tasks required for safe driving [14]. In 2011, 11% of adolescent drivers involved in fatal crashes were distracted, 21% of those by cell phone usage [15]; however, the accurate rate of driver distraction is likely under-reported [14]. Naturalistic driving studies, such as the 100-car study, provide the most accurate data, where, among all ages, driver distraction contributed to 22% of all crash and near-crash events [16]. Epidemiological studies conducted among drivers of all ages have also identified an increased crash risk associated with various potential distractions, including the presence of young passengers [17–20], cell phone use, and eating/smoking, or reaching for objects [21–25]. Crash risk is highest when DDBs involve complex visual-manual tasks, require several steps to complete, and do not involve built-in vehicle features [16,26]. Overall, naturalistic driving studies estimate that these high-risk DDBs that involve complex visual-manual tasks increase the crash or near-crash risk by 600%–2,300% [26].

Adolescents have higher rates of distracted driving crashes compared with older drivers [15,27]. This is partly due to their developmental stage but also reflects inexperience, as younger drivers lack critical driving skills possessed by more experienced adult drivers [3,28]. Adolescent drivers also overestimate their ability to multitask while driving [29] and are more willing than adults to adopt and intensely utilize new technologies (e.g., cell phones) that are an important source of driver distraction [30,31]. Elevated risk-taking and sensation-seeking behaviors, combined with underdeveloped driving skills and high rates of technology use, increase the likelihood that adolescents will engage in DDBs that increase their crash risk [32].

Similar to other health-related behaviors, adolescent driving is strongly influenced by parenting styles and modeling of behaviors [33–38]. Observational studies demonstrate significant concordance between parent and adolescent driving styles [39]. Furthermore, young drivers who have strong parental role models that provide positive feedback about safe driving establish open lines of communication with their adolescent drivers, and convey specific and clear messages/limits about traffic safety report less risk taking and more commitment to safe and less aggressive driving [40]. Although parents are important influences on teen driving, adolescents are also highly susceptible to peer influences, where perceived and actual peer behaviors can influence risk behaviors [41,42]. Prior research demonstrates that having friends who engage in risky driving predicts future-driving risk for newly licensed adolescent drivers [43] and impaired driving among adolescents, generally [44].

The theory of normative social behavior provides a framework for understanding how adolescent risk taking and sensation seeking combine with parent and peer influences to shape adolescent DDBs (Figure 1). Social norms are observed or perceived patterns that define acceptable beliefs, attitudes, and behaviors. Descriptive norms refer to an individual's beliefs about a behavior that are gained as a result of observing the actions of others. Injunctive norms are individual perceptions about the expectations and resulting approval of valued family members or peers [45]. Within this framework, injunctive norms modify the effect of descriptive norms on health-related behavior, strengthening it when descriptive and injunctive norms are aligned and reducing or negating it when they are opposed [45]. Furthermore, individual levels of risk perception and sensation seeking may modify the influence of social norms on negative health behaviors such as distracted driving.

This study examines the contributions of social normative influences (parent and peer), individual risk perception, and sensation seeking on adolescent DDBs. It was hypothesized that, compared with descriptive normative influences, injunctive normative influences would more strongly predict adolescent DDBs and also would partially account for descriptive normative influences, although both were hypothesized to be positively associated with adolescent DDBs. Furthermore, individual-level risk taking and risk perception were hypothesized to have the strongest association with adolescent DDB. The influences of social norms were examined overall and by individual sex. Prior distracted driving literature has not examined how social normative influences vary by sex, and given the higher crash risk observed among male adolescents [10,46–50], understanding DDB influences by sex may also aid in our understanding of differential crash risk. Results will also aid the development of behavioral interventions aimed at reducing DDBs among adolescent populations and mitigating the risk for crash-associated injury.

Methods

Study design

This study presents data on adolescent DDBs collected as part of a nationwide telephone survey of 16- to 18-year-old drivers and the parents of similarly aged adolescent drivers. Data were collected by a professional marketing research company on behalf of Toyota,

providing a representative sample of U.S. adolescent drivers and their parents. This analysis examines the subsample of parent–adolescent dyads living in the same household.

Study population

Eligible participants included adolescents who were aged 16–18 years, English speaking, had an active driver license, and lived within the family home. Adolescents who had graduated high school earlier that year but had not yet moved out of the family home were eligible for inclusion. Participants were excluded if they were actively driving when contacted for the interview (i.e., driving and talking on a cell phone) or if they did not drive. In addition to the adolescent, the adolescent's parent was also interviewed.

Telephone survey protocol

The telephone survey was conducted by American Directions Group, utilizing a computer-assisted telephone interviewing system, from July to November 2012. Interviewers were formally trained to maximize response rates and accurate data collection. Call center supervisors monitored interview quality.

The survey was administered to eligible participants utilizing list-assisted (age-targeted list of families with 16- to 18-year-olds) random digit dialing, providing representation of listed and unlisted, as well as landline and cellular telephone numbers. Participant telephone numbers were randomly selected from an age-targeted list and were proportionally stratified by county and telephone exchange to adequately reflect the county's share of all U.S. telephone numbers. Numbers were called in a series of small random samples to ensure that complete call procedures were followed and that the regional distribution of numbers was appropriate and to increase sample representativeness. Seven attempts were made to complete an interview at each telephone number, and contact times were staggered to maximize potential for participant contact. For the overall telephone survey, 23% of eligible participants where a phone contact was successful and eligibility was able to be determined completed the full survey. Toyota contracted the University of Michigan Transportation Research Institute to analyze the data and report survey results.

Following verbal parent consent and adolescent assent or consent depending on age, the survey was administered to the parent within each dyad followed by their child. Participants were explicitly asked to ensure nobody else was in the room during survey administration to ensure privacy. Telephone interviews lasted an average of 19.5 minutes for parents and 14.0 minutes for adolescents. Incentives to participate were not provided although respondents were informed about the survey's social importance and assured of confidentiality. The University of Michigan Institutional Review Board reviewed the study procedures, and the study was assigned an exempt status.

Measures

DDB was measured using an eight-item scale developed for this study assessing participants' frequency of engagement in distracting behaviors while driving. A range of behaviors was assessed, including socially oriented behaviors (e.g., "Respond to a text message"), task-oriented behaviors (e.g., "Read written directions"), and entertainment

behaviors (e.g., “Watch online video”). Responses were on a five-point scale (1 = never, 2 = less than once/trip, 3 = once or twice/trip, 4 = three to five times/trip, and 5 = more than five times/trip). Item scores were averaged within participant to yield a total DDB score. This measure was administered to parents (Cronbach’s α = .54) and adolescents (α = .70). The adolescent DDB score was the outcome of interest in this study.

Parents completed standard *demographic* (age, sex, and race/ethnicity) and *socioeconomic* (household income, highest level education, and marital status) *measures*. Adolescents were asked their current age in years, *sex*, and *school grade*.

Sensation seeking was assessed for both parents and adolescents with the Brief Sensation Seeking Scale-4 [51,52], which asked participants how strongly they agreed with four statements describing sensation seeking (e.g., “I would like to explore strange places”). A five-point response scale (1 = strongly disagree and 5 = strongly agree) was averaged within subject, creating a mean score (parent: α = .65; adolescent: α = .68).

Risk perception was assessed for parents and adolescents by asking how willing they were to engage in 16 distracted driving scenarios (e.g., “send a text message while driving in heavy freeway traffic”) [53]. A 10-point response scale (1 = absolutely would not do this task and 10 = very willing to do this task) was used, and items were reverse scored so higher scores indicated higher risk perception. Scores were averaged within subject to create mean parent and adolescent risk perception scores (parent: α = .92; adolescent: α = .89).

Perceived parent DDB (descriptive norms) was assessed with an eight-item self-report measure that asked adolescents how often their parents engaged in DDB. Adolescents were asked to comment on the parent who engaged in DDB at a higher level. The scale mirrored that used to measure self-reported DDB. The response scale was 1 = never, 2 = less than once/trip, 3 = once or twice/trip, 4 = three to five times/trip, and 5 = more than five times/trip (α = .71).

Parent approval of DDB (injunctive norms) was assessed by asking parents to rate how strongly they disapproved/approved of their adolescent engaging in DDBs. The eight items used were the same as those measuring self-reported DDB, but responses were on a 10-point scale (i.e., 1 = strongly disapprove and 10 = strongly approve; α = .92).

Two measures assessed peer influence. Adolescents were asked to report how often they thought their peers engaged in DDBs (*perceived peer DDB*, descriptive norms) and how much they thought their peers would approve of them engaging in DDBs (*perceived peer approval of DDB*, injunctive norms). These scales were the same as those measuring perceived parent DDB. Peer engagement in DDBs was reported on a five-point scale: 1 = never, 2 = less than once/trip, 3 = once or twice/trip, 4 = three to five times/trip, and 5 = more than five times/trip (α = .82). Peer approval of DDB used a 10-point scale (i.e., 1 = strongly disapprove and 10 = strongly approve; α = .89).

Statistical analysis

Univariate and bivariate descriptive statistics were computed. Hierarchical multiple linear regression was used to model predictors of adolescent DDB. Models were constructed by

sequentially adding blocks of predictors. In Model 1, sociodemographic and parent measures of risk perception and sensation seeking were entered. Model 2 added parent influences (parent DDB, adolescent perception of parent DDB, and parent approval of adolescents' DDB). Peer influences (the adolescent's perception of their peers' DDB and peer approval of DDB) were entered in Model 3, and adolescent risk perception and sensation seeking were entered in Model 4. The regression models were estimated overall and by gender. The potential moderating influence of injunctive norms (parent approval of adolescent DDB and perceived peer approval of adolescent DDB) on the relationship between adolescent risk perception and DDB was also tested.

Results

Descriptive statistics

Sociodemographic characteristics of the 403 parent–adolescent dyads are listed in Table 1. Parents were mostly female (75.9%), aged 45–54 years (65.3%), and had at least a 4-year college degree (59.5%). The majority of adolescents were male (52.6%), and 51.4% were entering their last year of high school. Households were overwhelmingly white (93.4%), high-income earners (64.8% >$75,000), and two-parent (94.0%).

Adolescent distracted driving behavior

Most of the adolescents (91.8%) reported regularly (at least once/trip) engaging in at least one of the eight DDBs. The most commonly reported behaviors were looking for something in the vehicle, eating or drinking something, using an electronic device for music, and dealing with passengers. Adolescents engaged frequently in texting/cell phone behaviors, with 48% reporting texting and 68% reporting talking on a telephone at least once a trip. Table 2 lists the overall mean scores for each measure, the means of each measure by sex of the adolescent participant, and the results from independent sample *t* tests comparing the mean scores for female versus male participants. Adolescents reported higher mean scores of DDB than their parents (1.76 ± .5 vs. 1.59 ± .3, respectively, $p < .0001$; Table 2). When compared with themselves, adolescents reported that their parents (1.99 ± .5 vs. 1.76 ± .5, respectively, $p < .0001$) and peers (2.45 ± .7 vs. 1.76 ± .5, respectively, $p < .0001$) engaged more often in DDB. Overall, both adolescents and parents perceived DDB as an inherently high-risk activity (8.46 ± 1.2, respectively; 8.10 ± 1.4, respectively, $p < .0001$).

There were no differences between male and female adolescents' DDB or perceived parent and peer DDB. However, male adolescents reported greater perceived peer approval of DDB (4.15 ± 1.9 vs. 3.54 ± 1.8, respectively, $p = .002$). Furthermore, male adolescents had higher sensation seeking (3.10 ± .8 vs. 2.88 ± .8, respectively, $p = .008$) and lower risk perception (7.88 ± 1.5 vs. 8.33 ± 1.4, respectively, $p = .002$) than females.

Bivariate analysis

Table 3 lists the bivariate correlations. Adolescent DDB was positively correlated with parent influences: parent DDB ($r = .20$), perceived parent DDB ($r = .41$), and parent approval of teens' DDB ($r = .15$). Adolescent DDB was also correlated with peer influences: perceived levels of peer DDB ($r = .44$) and perceived peer approval of teens' DDB ($r = .51$).

Adolescents' DDB was also positively correlated with their sensation seeking ($r = .37$) and perceived risk of distracted driving ($r = -.64$). Male and female adolescents differed mainly with respect to parents' risk perception, which was more strongly associated with DDB of adolescent females ($r = -.21$) than males ($r = -.14$).

Multivariate analysis

Tables 4–6 list results for the multiple linear regression predicting adolescent DDB. The model was adjusted first for parents' demographic features and parents' risk acceptance (sensation seeking and risk perception) and then for parent influences, peer influences, and finally, adolescent risk acceptance. Parents' descriptive norms were noted to be significant, with parents' DDB and teens' perception of parents' DDBs significant in the overall model. This differed by gender, however, with parents' DDB predictive of adolescent DDB among male adolescents and perceived parental approval of DDB predictive of adolescent DDB among female adolescents. Parent's injunctive norms (i.e., perceived parental approval of DDB) were not significant in any of the multivariate models.

Among peer influences, descriptive normative influences, as measured by perceived peer DDB, were significant in the full adolescent model but did not reach significance when examined independently by gender. Injunctive normative influence (i.e., perceived peer approval of DDB) was initially significant in the regression models (full adolescent sample, male, female) before adjusting for risk perception. Adolescent risk perception was noted to have the strongest association with adolescent DDB in the final model and was found predictive for both sexes but more strongly predictive for males.

The potential moderating influence of injunctive norms on the relationship between adolescent risk perception and DDB was also tested (Tables 7–12). For a given level of risk perception, greater parental approval of adolescent DDB did not significantly alter the relationship between risk perception and adolescent DDB. However, for a given level of risk perception, greater perceived peer approval of adolescent DDB increased the association of risk perception with adolescent DDB ($p < .05$). This relationship remained significant when tested individually by sex.

Discussion

This study examined adolescent risk perception and social influences as predictors of adolescent DDB using a social normative framework. Adolescents within our sample reported high levels of DDBs, with almost 92% regularly engaging in them. Given evidence from studies of crash and near-crash events, these levels represent a considerable crash risk for adolescents and reinforce the need to better understand those factors that influence and promote DDB. The results have implications for public policy and future interventions to reduce adolescent distraction-related crash risk.

Adolescent DDB did not significantly differ by gender. Although these results are consistent with prior literature on driver distraction [22,54–58], young males are known to have an overall higher crash risk than similarly aged females [10,46–50]. Although our study did not specifically address crash risk, our findings suggest that the higher crash risk observed

among adolescent males may not be directly attributable to a higher level of involvement in DDB. DDBs may combine with other individual level characteristics that are more prevalent or exert a greater influence among male adolescents to account for their increased crash involvement [46,47,59]. Further study is needed to understand this potential relationship. However, male adolescent participants had lower risk perception, higher sensation seeking, and higher perceived peer social approval of DDB compared with females, highlighting that although male and female adolescents engage in DDB at similar levels, sex differences do exist in the motivations and social norms that might influence their behavior and ultimately may differentially influence their crash risk. Although practically, this may not affect the types of behavioral interventions needed, our finding that males and females engage in DDB at similar levels does suggest that behavioral interventions are needed to address DDB among adolescents of both sexes.

Among male and female adolescents, risk perception was the strongest predictor of DDB in the multivariate model. This is consistent with research on other high-risk adolescent driving behaviors (e.g., speeding and alcohol-impaired driving) in which risk perception or risk propensity is a significant factor [60,61]. Younger novice drivers perceive relatively lower risk levels for high-risk driving situations [62], underestimate serious consequences associated with high-risk behaviors [63–65], and overestimate their ability to both recognize and navigate hazardous situations [66,67]. These results reinforce the need for targeted behavioral interventions to reduce adolescent DDB. Prior research has shown that driver education is not sufficient to reduce adolescent crash risk [68,69]. However, *structured brief interventions and referral to treatment* programs have shown promise addressing substance use and violence among high-risk youth [70–73] and could be modified for use in future programs targeting adolescent novice drivers to reduce DDB. In addition, DDB could be included as a component of future modifications to graduated driver licensing policies, which are designed to gradually introduce drivers to increasingly challenging and hazardous situations. As a component of graduated driver licensing, adolescents could progress through a stepwise introduction to potentially distracting behaviors (e.g., utilization of in-vehicle technologies such as navigation systems or entertainment systems), ensuring that they have gained necessary experience before engaging with sources of distraction.

Interestingly, parents' descriptive norms, but not injunctive norms, were predictive of adolescent DDB in the multivariate model. The findings for parental injunctive norms, measured using parental approval of adolescent behavior, were surprising, given prior studies that have shown a positive association between authoritative parenting styles, characterized by the use of close parental monitoring of adolescent behavior, parental control (i.e., rule setting and expectation setting for adolescent behavior), and driving restrictions, and less adolescent risky driving [35,36,38]. Furthermore, we tested the potential moderating influence of parental injunctive norms on adolescent risk perception and found that for a given level of risk perception, increasing parental approval did not alter the association with adolescent DDB. This may reflect the fact that adolescents, while likely to model their driving on parental behavior, may be more influenced at this age by perceived peer approval of their behavior (i.e., peer injunctive norms) than parental approval of their behavior. Alternatively, these findings may suggest that parental approval of adolescent DDB is either a poor measure for parental injunctive norms or measuring only one parent's

approval (75% respondents were female in our study) rather than both parents. Further study of the role of parental injunctive normative influences is needed to understand their role in the conceptual model as proposed by Rimal and Real [45] and adapted for this study (Figure 1).

However, the importance of parental descriptive normative influences indicates that there is a role for parent-directed interventions that focus on parental modeling and monitoring of adolescent DDB. In our sample, parents influenced adolescent driving patterns through their own driving behavior and by their interpretation of societal norms and values regarding DDB. This is consistent with prior literature demonstrating the importance of parental modeling in other adolescent risk behaviors, including alcohol and cigarette use [74]. Prior studies have also shown that parents with higher levels of crashes and violations are more likely to have children with high levels of crashes and violations [75]. In addition, interventions that increase parental involvement as adolescents drive, as well as increasing supervised driving practice and regulation of drivers during the licensing period may also be effective in altering overall risk perception and descriptive social normative influences. The Checkpoints program, a parent-directed intervention to reduce novice driver risk through a combined approach of targeted education raising parents' motivation to intervene and a parent–teen driving contract, has been shown to significantly reduce adolescent risky driving behaviors and increase parental monitoring during the novice driver period [76–80]. Building on the current program or developing novel parent-directed interventions targeting distracted driving and including a written parent–teen agreement that outlines avoidance by both parties of DDB (e.g., texting, cell phone use, and eating) could improve modeling behaviors and could increase parental monitoring of adolescent DDB behavior at this critical stage of driver learning.

Peer influence on risky driving behaviors has previously been shown to be associated with injunctive normative influences or the perceived attitudes and expectations of friends [43,45]. Similar to parents' influences, we found that peers' descriptive normative influences, as measured by adolescent perception of peer DDBs, were more predictive of adolescent DDB than peers' injunctive normative influences in the multivariate regression model. Injunctive normative influences, however, were noted to be significant before adjusting for adolescent risk perception and were noted to increase the association of risk perception and DDB when testing the moderating influence of injunctive norms. This, combined with the bivariate observation that injunctive normative influences were highly correlated with risk perception, suggests that injunctive norms may serve primarily as an influence on adolescent risk perception for negative health behaviors. In addition, these findings combined with the observation that adolescents perceive that their friends engage in DDBs more often than they themselves demonstrate the importance of considering misperceptions of social norms when designing interventions to decrease peer influence. One potential avenue is the use of social marketing techniques such as targeted media and educational campaigns that reset perceived social norms regarding DDBs. Social marketing campaigns have been previously utilized to reduce alcohol consumption among college students by correcting misperceptions about how much their peers are actually engaging in risky drinking behavior [81–83]. Given the prior success of parent-directed interventions,

increasing parent awareness of peer influences as a component of parent-directed interventions may also aid in reducing adolescent driver risk.

These results should be considered in the context of several limitations. The study was a cross-sectional survey of parent–adolescent dyads, limiting both determinations of causality and observations of how behaviors changed over time. Although the sampling frame was designed to yield a nationally representative sample, the respondents in the parent–adolescent dyad sample were mostly white, married, higher income families, limiting the generalizability of the results beyond this population and potentially missing key differences in DDBs among lower socioeconomic classes and minority populations. In addition, the inability to contact nonrespondents limits the ability to determine whether they differed in any meaningful way from those participants who completed the survey. The self-report nature of the survey may have led to under-reporting of distracting behaviors, especially among parents, and should be interpreted within this context. This as well as the socially prescribed nature of distracted driving may introduce recall and social desirability bias into the data. Several strategies, however, were employed to decrease the introduction of bias, including maintaining interviewer focus on specific behaviors and never referring to "distracted driving" specifically. In addition, as adolescents were asked to report on the parent who performed DDB at a higher level, the finding that adolescents reported higher levels of DDB for their parents than the parent self-reported DDB may reflect an adolescent's perception of the parent who did not complete the survey, potentially influencing the interpretation of results regarding injunctive normative influences (e.g., *perceived parental DDB*). Previously validated survey measures for DDBs, including point estimates of frequency, degree of distraction, or crash risk, do not currently exist. However, the concordance among the measures created for this survey suggests that the measures utilized in our analysis provide valid information on DDB that can be reasonably interpreted.

Driver distraction contributes to a considerable number of fatal and nonfatal traffic crashes annually. Parents and peers are important role models for adolescent drivers and establish norms regarding acceptable behavior regarding DDB. Within this context, we found that parent and peer descriptive norms (i.e., observed behavior) influence adolescent high-risk DDBs along with adolescent risk perception, which was noted to be the strongest predictor of adolescent DDB. Further study of injunctive norms, especially parental influences, is required to understand their role in influencing adolescent DDB. Behavioral interventions that target parental modeling, increase parental monitoring of adolescent DDB, and correcting misperceptions about both parent and peer DDB may aid in decreasing adolescent DDB and crash risk.

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IMPLICATIONS AND CONTRIBUTION

Reducing adolescent distracted driving behavior (DDB) could decrease the high crash rates observed among novice drivers. Utilizing a telephone survey of adolescent–parent dyads, we found that parents' role modeling as well as the observed behavior of parents and peers influenced adolescent DDBs, providing important information for future intervention efforts.

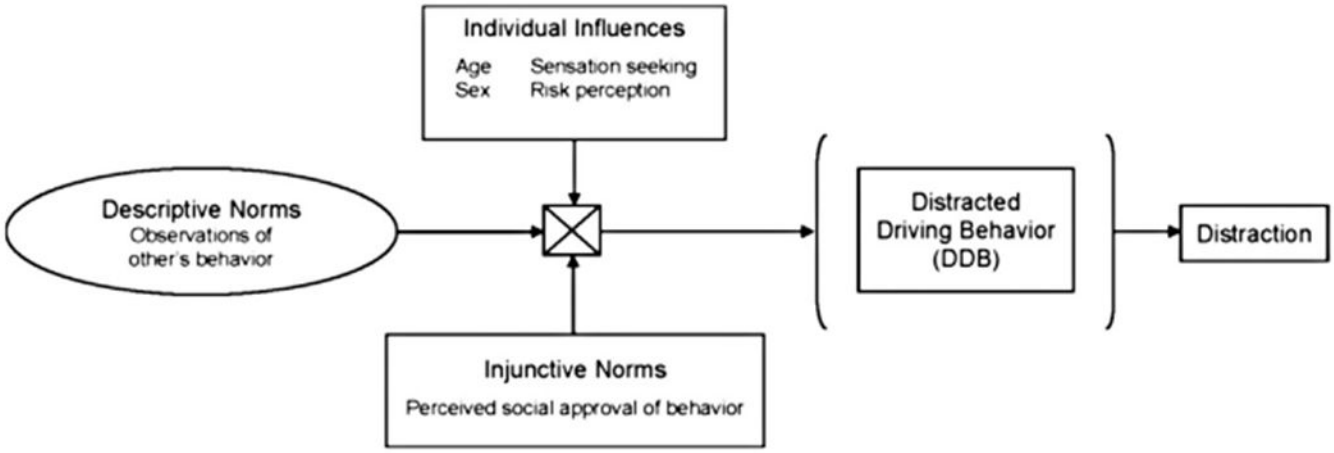

Figure 1.
A conceptual model for adolescent distracted driving building on the theory of normative social behavior.

Table 1

Demographic characteristics of the parent–adolescent dyad sample

	Parents, n (%)	Adolescents, n (%)
Sex		
Male	97 (24.1)	212 (52.6)
Female	306 (75.9)	191 (47.4)
Age (years)		
16	—	88 (21.8)
17	—	210 (52.1)
18	—	105 (26.0)
30–44	84 (20.8)	—
45–54	263 (65.3)	—
55–65 and older	56 (13.9)	—
Highest education completed		
Grade school	2 (.5)	—
9th grade or less	—	6 (1.5)
10th grade	—	99 (24.6)
11th grade	—	207 (51.4)
Some high school	2 (.5)	—
High-school graduate	59 (14.6)	90 (22.3)
Some college, no degree	58 (14.4)	1 (.2)
Vocational/2-year college degree	42 (10.4)	—
4-year college/Bachelor degree	142 (35.2)	—
Some postgraduate/Master degree	91 (22.6)	—
Doctorate degree	7 (1.7)	—
		Dyads, n (%)
Race/ethnicity		
Hispanic		12 (2.9)
White		381 (93.4)
Other		15 (3.7)
Household income		
Less than $15,000		6 (1.5)
$15,000–$39,000		21 (5.2)
$40,000–$74,999		90 (22.3)
$75,000–$99,999		99 (24.6)
$100,000 or higher		162 (40.2)
Marital status		
Never married		7 (1.7)
Married or living with partner		379 (94.0)
Separated, widowed, or divorced		16 (4.0)

Table 2

Mean scores of adolescents' and parents' measures for all adolescents and by adolescent gender

	All adolescents mean (SD)	Males mean (SD)	Females mean (SD)
Adolescents' self-reported DDB	1.76 (.5)	1.80 (.5)	1.72 (.5)
Parents' self-reported DDB	1.59 (.3)	1.56 (.3)	1.63 (.3)
Adolescents' report of parents' DDB	1.99 (.5)	1.99 (.5)	2.00 (.5)
Adolescents' report of peers' DDB	2.45 (.7)	2.48 (.7)	2.41 (.7)
Parents' approval of adolescents' DDB	1.87 (.9)	1.93 (1.0)	1.81 (.8)
Adolescents' report of peers' approval of adolescents' DDB **	3.86 (1.9)	4.15 (1.9)	3.54 (1.8)
Adolescents' sensation seeking **	3.00 (.8)	3.10 (.8)	2.88 (.8)
Parents' sensation seeking	2.31 (.7)	2.26 (.7)	2.35 (.8)
Adolescents' risk perception for DDB **	8.10 (1.4)	7.88 (1.5)	8.33 (1.4)
Parents' risk perception for DDB	8.46 (1.2)	8.52 (1.1)	8.4 (1.3)

Significant differences by sex are denoted by the following:

** $p < .01$.

DDB = distracted driving behavior; SD = standard deviation.

Table 3

Bivariate correlations comparing adolescent, parental, and peer DDBs within the parent–adolescent dyads and by adolescent gender

	1	2	3	4	5	6	7	8	9	10	11	12
All adolescents (n = 403)												
1. Adolescent DDB	—											
2. Parent sex	−.00	—										
3. Parent age	.04	.09	—									
4. Parent sensation seeking	.05	.14**	−.07	—								
5. Parent risk perception	−.17***	−.14**	.19***	−.20***	—							
6. Parent DDB	.20***	.04	−.20***	.15**	−.45***	—						
7. Perceived parent DDB	.41***	.08	−.10**	.04	−.28***	.27***	—					
8. Parent approval of DDB	.15**	.10*	−.06	.16**	−.54***	.29***	.15**	—				
9. Perceived peer DDB	.44***	.04	.01	.13**	−.17***	.13*	.48***	.13**	—			
10. Perceived peer approval of DDB	.51***	−.02	.07	.06	−.19***	.11*	.43***	.20***	.53***	—		
11. Adolescent sensation seeking	.37***	−.00	.04	.16**	−.05	.04	.18***	.10*	.31***	.36***	—	
12. Adolescent risk perception	−.64***	−.01	−.06	−.06	.27***	−.10*	−.46***	−.26***	−.46***	−.73***	−.44***	—
Male adolescents (n = 212)												
1. Adolescent DDB	—											
2. Parent sex	−.04	—										
3. Parent age	.03	.14*	—									
4. Parent sensation seeking	.01	.17*	−.13	—								
5. Parent risk perception	−.14*	−.12	.14*	−.25***	—							
6. Parent DDB	.21**	−.03	−.14*	.10	−.43***	—						
7. Perceived parent DDB	.34***	.02	−.02	−.03	−.24***	.19**	—					
8. Parent approval of DDB	.14	.17*	−.02	.16*	−.52***	.24***	.17*–	—				
9. Perceived peer DDB	.37***	.01	.00	.10	−.12	.06	.50***	.06	—			
10. Perceived peer approval of DDB	.44***	−.01	−.01	.07	−.21**	.12	.44***	.20**	.52***	—		
11. Adolescent sensation seeking	.31***	−.00	.07	.18*	−.03	.07	.17*	.04	.31***	.32***	—	

	1	2	3	4	5	6	7	8	9	10	11	12
12. Adolescent risk perception	−.60***	.05	−.06	−.07	.25***	−.12	−.46***	−.28***	−.44***	−.73***	−.40***	—
Female adolescents (n = 191)												
1. Adolescent DDB	—											
2. Parent sex	.01	—										
3. Parent age	.04	.02	—									
4. Parent sensation seeking	.10	.12	−.01	—								
5. Parent risk perception	−.21**	−.16*	.23**	−.16*	—							
6. Parent DDB	.23**	.15*	−.25***	.20**	−.46***	—						
7. Perceived parent DDB	.48***	.16*	−.18*	.12	−.32***	.35***	—					
8. Parent approval of DDB	.19*	.08	−.09	.17*	−.56***	.36***	.14	—				
9. Perceived peer DDB	.48***	.08	.02	.17*	−.24**	.22**	.47***	.20**	—			
10. Perceived peer approval of DDB	.57***	−.07	.12	.05	−.19**	.14	.45***	.19**	.55***	—		
11. Adolescent sensation seeking	.41***	−.03	−.01	.16*	−.09	.04	.21**	.16*	.30***	.34***	—	
12. Adolescent risk perception	−.67***	−.04	−.05	−.06	.31***	−.12	−.48***	−.23**	−.49***	−.72***	−.44***	—

DDB = distracted driving behavior.

*$p < .05$.

**$p < .01$.

***$p < .001$.

Table 4

Predictors of adolescent distracting behavior while driving

Predictor variables	Model 1	Model 2	Model 3	Model 4
Parent sex	−.03	−.07	−.03	−.02
Parent age	.08	.09	.06	.04
Parent sensation seeking	.06	.06	.04	.04
Parent risk perception for DDB	−.15[a]	.02	.05	.09
Parent DDB		.09	.10[a]	.14[a]
Perceived parental DDB		.37[a]	.17[a]	.13[a]
Parental approval of DDB		.05	.02	−.02
Perceived peer DDB			.16[a]	.12[a]
Perceived peer approval of DDB			.31[a]	−.01
Adolescent sensation seeking				.06
Adolescent risk perception				−.49[a]
R^2	.03	.18	.30	.43
Adjusted R^2	.02	.16	.29	.41
Durbin–Watson coefficient	1.94	1.90	1.85	1.95

n = 403.

DDB = distracted driving behavior.

[a]Standardized coefficients significant at $p < .05$.

Table 5

Predictors of adolescent male distracting behavior while driving

Predictor variables	Model 1	Model 2	Model 3	Model 4
Parent sex	−.05	−.07	−.04	.03
Parent age	.11	.10	.09	.02
Parent sensation seeking	−.02	.02	−.01	−.02
Parent risk perception for DDB	−.15[a]	.07	.08	.09
Parent DDB		.21[a]	.21[a]	.22[a]
Perceived parental DDB		.30[a]	.11	.04
Parental approval of DDB		.05	.02	−.04
Perceived peer DDB			.13	.10
Perceived peer approval of DDB			.29[a]	−.07
Adolescent sensation seeking				.04
Adolescent risk perception				−.57[a]
R^2	.03	.15	.25	.41
Adjusted R^2	.01	.12	.22	.37
Durbin–Watson coefficient	1.82	1.92	1.97	2.02

n = 212.

DDB = distracted driving behavior.

[a]Standardized coefficients significant at $p < .05$.

Table 6

Predictors of adolescent female distracting behavior while driving

Predictor variables	Model 1	Model 2	Model 3	Model 4
Parent sex	−.03	−.06	−.01	−.04
Parent age	.04	.09	.02	.05
Parent sensation seeking	.15[a]	.11	.09	.09
Parent risk perception for DDB	−.15[a]	.00	.07	.13
Parent DDB		−.04	−.04	.00
Perceived parental DDB		.48[a]	.26[a]	.26[a]
Parental approval of DDB		.09	.08	.05
Perceived peer DDB			.22[a]	.14
Perceived peer approval of DDB			.32[a]	.05
Adolescent sensation seeking				.08
Adolescent risk perception				−.42[a]
R^2	.05	.24	.40	.50
Adjusted R^2	.03	.21	.37	.47
Durbin–Watson coefficient	2.05	2.07	1.98	1.99

Adolescent report of peers' DDB had a $p = .0511$ in Model 4 for the girls.

n = 191.

DDB = distracted driving behavior.

[a]Standardized coefficients significant at $p < .05$.

Table 7

Predictors of adolescent distracting behavior while driving, testing the interaction between perceived peer approval and adolescent risk perception

Predictor variables	Model
Perceived peer approval of DDB *	−.62
Adolescent risk perception *	−.88
Perceived peer approval of DDB–adolescent risk perception interaction *	.56
R^2	.41
Adjusted R^2	.40
Durbin–Watson coefficient	1.95

n = 403.

DDB = distracted driving behavior.

* $p < .05$.

Table 8

Predictors of adolescent male distracting behavior while driving, testing the interaction between perceived peer approval and adolescent risk perception

Predictor variables	Model
Perceived peer approval of DDB *	−.71
Adolescent risk perception *	−.93
Perceived peer approval of DDB–adolescent risk perception interaction *	.56
R^2	.38
Adjusted R^2	.37
Durbin–Watson coefficient	1.97

n = 212.

DDB = distracted driving behavior.

* $p < .05$.

Table 9

Predictors of adolescent female distracting behavior while driving, testing the interaction between perceived peer approval and adolescent risk perception

Predictor variables	Model
Perceived peer approval of DDB	−.48
Adolescent risk perception *	−.79
Perceived peer approval of DDB–adolescent risk perception interaction *	.52
R^2	.43
Adjusted R^2	.42
Durbin–Watson coefficient	2.08

Adolescent report of perceived peer approval of DDB had a $p = .0643$ for the girls.

n = 191.

DDB = distracted driving behavior.

* $p < .05$.

Table 10

Predictors of adolescent distracting behavior while driving, testing the interaction between parental approval and adolescent risk perception

Predictor variables	Model
Parent approval of DDB	.04
Adolescent risk perception *	−.60
Parent approval of DDB–adolescent risk perception interaction	−.03
R^2	.38
Adjusted R^2	.37
Durbin–Watson coefficient	1.96

n = 403.

DDB = distracted driving behavior.

* $p < .05$.

Table 11

Predictors of adolescent male distracting behavior while driving, testing the interaction between parental approval and adolescent risk perception

Predictor variables	Model
Parent approval of DDB	.27
Adolescent risk perception *	−.50
Parent approval of DDB–adolescent risk perception interaction	−.28
R^2	.36
Adjusted R^2	.36
Durbin–Watson coefficient	1.96

n = 212.

DDB = distracted driving behavior.

* $p < .05$.

Table 12

Predictors of adolescent female distracting behavior while driving, testing the interaction between parental approval and adolescent risk perception

Predictor variables	Model
Parent approval of DDB	−.08
Adolescent risk perception *	−.66
Parent approval of DDB–adolescent risk perception interaction	.12
R^2	.40
Adjusted R^2	.39
Durbin–Watson coefficient	2.05

n = 191.

DDB = distracted driving behavior.

* $p < .05$.