

Evidence-Based Strategies/Interventions Review for Distracted Driving

Texas Governor's EMS & Trauma Advisory Council

Injury Prevention Committee

Motor vehicle crashes are the leading cause of death for persons 15-24 years of age in the U.S.¹ Distracted driving has joined alcohol and speeding as a leading factor in fatal and serious injury crashes. Every day in the U.S., more than 9 people are killed and more than 1,153 people are injured in crashes that involve a distracted driver.² A 2012 study by the University of Michigan Transportation Research Institute and Toyota found that 26% of teens respond to a text message once or more every time they drive.³ Also, 20% of teens and 10% of parents admitted that they have extended, multi-message text conversations while driving.³

A Centers for Disease Control and Prevention (CDC) study analyzing 2011 data found that 69% of drivers reported talking on their cell phone at least once in the past 30 days, and 31% reported that they had read or sent texts or emails while driving in the last 30 days.²

A 2014 survey conducted by the AAA Foundation for Traffic Safety found that nationally, 69% of drivers reported talking on a cell phone (handheld or hands-free) while driving in the past month.⁴ Sixty-two percent reported doing this on more than one occasion, and 29% said they do so fairly often or regularly.⁴ Additionally, 27% of drivers admitted to typing or sending a text or email and 36% admitted to reading a text or email while driving in the past month.⁴

The Injury Prevention Committee of the Texas Governor's EMS & Trauma Advisory Council conducted an extensive literature review among peer-reviewed journals, government resources, injury prevention outlets, and private corporations' websites in 2016. The focus of the review was limited to interventions to reduce or prevent distracted driving. Committee members reviewed published articles/information from the following organizations/websites.

- Pub Med
- Embase
- Cinahl
- Centers for Disease Control and Prevention
- National Highway Traffic Safety Administration
- National Safety Council
- Federal Highways Administration
- World Health Organization
- Governors Highway Safety Association
- Texas Department of Transportation
- Distracted Driving.gov
- Safe Kids Worldwide
- American College of Emergency Physicians
- Insurance companies

This document is intended to provide information specifically about strategies/interventions that are effective in preventing distracted driving. This document was developed in 2016 based on the information that was available at that time; as new evidence/studies become available, the document will need to be revised.

The review was conducted using the following question – *What are the evidence-based strategies or countermeasures that reduce distracted driving among persons 16+ years of age?* For the purposes of this document, distracted driving was defined as driver inattention that occurs when drivers divert their attention from the driving task to focus on another activity.⁵

The key search words used were: (evaluation of distracted driving prevention) OR (evaluation of distracted driving prevention interventions) OR (evaluation of distracted driving countermeasures) OR (evaluation of technology to prevent distracted driving) OR (evaluation of state laws/policies to prevent distracted driving) OR (mindfulness and driving) OR (inattention and driving). The years searched for all questions were 1999-2016. The language searched was English.

The Injury Prevention Committee used the Nursing Levels of Evidence from "*Evidence-based Practice in Nursing & Healthcare: A Guide to Best Practice*"⁶ to determine criteria for evidence-based strategies/interventions.

Level I: Evidence from a systematic review of all relevant randomized controlled trials (RCT's), or evidence-based clinical practice guidelines based on systematic reviews of RCT's

Level II: Evidence obtained from at least one well-designed Randomized Controlled Trial (RCT)

Level III: Evidence obtained from well-designed controlled trials without randomization, quasi-experimental

Level IV: Evidence from well-designed case-control and cohort studies

Level V: Evidence from systematic reviews of descriptive and qualitative studies

Level VI: Evidence from a single descriptive or qualitative study

Level VII: Evidence from the opinion of authorities and/or reports of expert committees

Only articles/information that included evaluation of distracted driving prevention measures/countermeasures were reviewed. Information was reviewed by the Committee and placed in the appropriate level. Based on the review, "grades" were assigned to the studies (Tables 1 and 2).

It was determined that strategies/interventions in Levels I-II showed strong evidence based on research and evaluation. If evaluation of strategies/interventions in those levels were effective in reducing distracted driving, they were placed in the High or Green category.

If an article was in Levels III-V, the strategies/interventions were placed in the Moderate or Yellow category.

If the evaluation of strategies/interventions in Levels I-IV showed the strategy/intervention was ineffective or harmful, it was placed in the Low or Red category.

Studies/interventions in Levels V-VII and activities described on websites that: 1) had not been published in a peer-reviewed journal or 2) did not provide evaluation results, were placed in the Very Low or Gray category.

Table 1

SUPPORT USE Good Quality Study AND Positive Impact on Prevention	CAUTION Quality of Study has Limitations AND Impact on Prevention Inconclusive	AVOID Low Quality Study AND Negative Impact on Prevention	DISCRETION Very Low Quality Study or No Evaluation AND Unknown Impact on Prevention
AVOID Good Quality Study AND Negative Impact on Prevention	DISCRETION Moderate Quality Study AND Limited Negative Impact on Prevention	DISCRETION Low Quality Study AND Poor Negative Impact on Prevention	DISCRETION Quality Study or No Evaluation AND Unknown Impact on Prevention

Table 2

Grade	Nursing Level	Document Category
High	I-II (+) Positive Impact	Green
Moderate	III-V (Inconclusive Evidence)	Yellow
Low	I-IV (-) Negative Impact	Red
Very Low	VI-VII or No evaluation	Gray

At the time this review was completed, there were only two studies meeting the criteria of High. However, there are several research studies involving crash avoidance systems on vehicles, including vehicle to vehicle (V2V) technology being conducted by the U.S. Department of Transportation, which has the potential to dramatically reduce crashes caused by human error.^{7,8}

STUDIES

GRADE: HIGH (GREEN) GOOD. Use Supported. There is strong evidence based on research and evaluation that these strategies have been shown to reduce distracted driving.



Steering teens safe: a randomized trial of a parent-based intervention to improve safe teen driving

Background: Crashes are the leading cause of death for teens, and parent-based interventions are a promising approach. We assess the effectiveness of Steering Teens Safe, a parent-focused program to increase safe teen driving.

Methods: Steering Teens Safe aimed to improve parental communication with teens about safe driving using motivational interviewing techniques in conjunction with 19 safe driving lessons. A randomized controlled trial involved 145 parent-teen dyads (70 intervention and 75 control). Intervention parents received a 45-minute session to learn the program with four follow-up phone sessions, a DVD, and a workbook. Control parents received a standard brochure about safe driving. Scores were developed to measure teen-reported quantity and quality of parental communication about safe driving. The main outcome measure was a previously validated Risky Driving Score reported by teens. Because the Score was highly skewed, a generalized linear model based on a gamma distribution was used for analysis.

Sample: Teens 15 years and older and their parents, 80% of parents were mothers and 66% were college graduates; English-speaking only; 98% Caucasian

Results: Intervention teens ranked their parent's success in talking about driving safety higher than control teens ($p = 0.035$) and reported that their parents talked about more topics (non-significant difference). The Risky Driving Score was 21% lower in intervention compared to control teens (85% CI = 0.60, 1.00). Interaction between communication quantity and the intervention was examined. Intervention teens who reported more successful communication had a 42% lower Risky Driving Score (95% CI = 0.37, 0.94) than control parents with less successful communication.

Conclusions: This program had a positive although not strong effect, and it may hold the most promise in partnership with other programs, such as Driver's Education or Graduated Driver's License policies.⁹

Level of Evidence – II

Recommendation: This program had a positive although not strong effect, and it may hold the most promise in partnership with other programs, such as Driver's Education or Graduated Driver's License policies.

Citation: Peek-Asa C, Cavanaugh JE, Yang J, Chande V, Young T, Ramirez M. Steering teens safe: a randomized trial of a parent-based intervention to improve safe teen driving. BMC Public Health 2014;14:777. DOI: 10.1186/1471-2458-14-777. Published: 31 July 2014



Implementation Evaluation of "Steering Teens Safe": Engaging Parents to Deliver a New Parent-Based Teen Driving Intervention to Their Teens

Parents play a fundamental role in teaching their children safe driving skills to reduce risk of motor vehicle crashes, the leading cause of death for teens. "Steering Teens Safe" is a new parent-based intervention that equips parents with communication skills to talk about, demonstrate, and practice safe driving behaviors and skills with their teens. This implementation evaluation focuses on a sample of 83 parents who delivered "Steering Teens Safe" to their teens. One-, 2- and 3-month follow-up assessments were conducted with intervention parents to evaluate the self-reported quantity and quality of talking about, demonstrating, and practicing safe driving goals with teens; perceived success and benefit of the program; and barriers to implementation. Over 3 months of follow-up, parents discussed driving goals with their teens for a median of 101.5 minutes. The most frequently addressed topics were general safety principles, including distracted driving, driving in bad weather, wearing a seat belt, and being a safe passenger. Parents spent a median of 30 minutes practicing "safe driving skills" such as changing lanes. Sixty-seven percent of parents talked to their children about "rural road safety," but just 36% demonstrated and half practiced these skills with their teens. Barriers to implementation include time and opportunity barriers and resistant attitudes of their teens. However, barriers neither affected frequency of engagement nor parents' perceived benefit and comfort in delivering the program. Parents with time/opportunity barriers also had higher practice and demonstration times than parents without these barriers. Findings indicate high acceptability among parent implementers and promise for real-world delivery. Future studies are needed to assess intervention impact.¹⁰

Level of Evidence – II

Recommendation: Findings indicate high acceptability among parent implementers and promise for real-world delivery. Future studies are needed to assess intervention impact, especially with minority and non-English speaking populations.

Citation: Ramirez, Marizen; Yang, Jingzhen; Young, Tracy; Roth, Lisa; Garinger, Anne; Snetselaar, Linda; Peek-Asa, Corinne. Implementation Evaluation of "Steering Teens Safe": Engaging Parents to Deliver a New Parent-Based Teen Driving Intervention to Their Teens. *Health Education & Behavior*, v40 n4 p426-434 Aug 2013.



Front Windshield Sticker Reminder

Texting while driving is a dangerous activity that is on the rise in the United States (U.S.). Since 2011 there has been a 17% increase in the number of people injured in a motor vehicle crash involving a distracted driver. Bans on the act of texting and driving have already taken place in 46 states in the U.S., but studies have shown that they are ineffective. An unstudied method of reducing texting while driving is sticker reminders. Sticker reminders have already been proven to be an effective intervention in the realm

of driver safety; one study found that a “Buckle-Up” dashboard sticker doubled the use of safety belts by front seat passengers. In this study, 104 medical students aged 21 - 29, from the University of Central Florida (UCF) College of Medicine were randomly divided into two groups, an interventional group receiving a “Drive in the Moment” windshield sticker, and a control group not receiving the sticker. Both groups took a pre- and post-survey that recorded self-reported texting and driving frequency. The results showed that after three weeks, the sticker intervention significantly reduced reported rates of sending texts while driving, reading texts while driving, and using social media while driving ($p < 0.05$). The results of this study suggest that a novel sticker-intervention could potentially serve as a point of attack when addressing the growing and dangerous texting while driving the epidemic.¹¹

Level of Evidence – II

Recommendation: Findings indicate that a sticker reminder placed on the front windshield of the vehicle may be effective in reducing texting while driving. The study was conducted among medical students aged 21 – 29 and may have social desirability bias. Future studies are needed to assess long-term intervention impact.

Citation: Rohl A, Eriksson S, Metcalf D. Evaluating the Effectiveness of a Front Windshield Sticker Reminder in Reducing Texting while Driving in Young Adults. [Cureus](#). 2016 Jul; 8(7): e691. Published online 2016 Jul 14. doi: [10.7759/cureus.691](https://doi.org/10.7759/cureus.691)

GRADE: MODERATE (YELLOW): MODERATE. Caution. The quality of the study has limitations. The evidence is inconclusive. These strategies need additional research and evaluation.

Environmental Strategies



Center line rumble strips

A comprehensive before-and-after study evaluated the safety impacts associated with application of shoulder and centerline rumble strips on highways in British Columbia, Canada. Data were collected for three groups of sites: treatment group, comparison group, and reference group.¹² The treatment group included 47 sites belonging to two highway classes: an undivided, rural two-lane arterial (RAU2) and a divided, rural four-lane freeway. A total of 225 sites were used to establish a comparison group for the treatment sites based on implementation year for the treatment site and the highway class. The comparison group was used to correct for the confounding factors of history and maturation. Six reference groups were used; they correspond to the two highway classes and three time periods (2000 to 2002, 2001 to 2003, and 2002 to 2004). Collision prediction models developed from the reference groups were used to correct for the regression to the mean and to account for the changes in traffic volumes in the before-and-after periods. Overall, the results showed that shoulder and centerline rumble strips can significantly reduce severe collisions and specific collision types: (a) the installation of rumble strips reduced all injury collisions by a statistically significant 18.0%; (b) shoulder rumble strips reduced off-road right collisions by a statistically significant 22.5%; and (c) centerline rumble strips (RAU2 sites) showed a statistically significant reduction of 29.3% in off-road left and head-on collisions. RAU2 sites with both centerline and shoulder rumble strips showed a statistically significant reduction of 21.4% in off-road right, off-road left, and head-on collisions combined.

Level of Evidence – IV

Recommendation: Need additional evaluation

Citation: Sayed, T., P. deLeur, J. Pump. "Impact of Rumble Strips on Collision Reduction on BC Highways: A Comprehensive Before and After Safety Study." TRB 89th Annual Meeting Compendium of Papers CD-ROM. Washington, D.C. 2010.



Road shoulder rumble strips

This study showed that shoulder rumble strips decreased off-the-road driver inattention crashes by 18-21%.¹³ Michigan researchers analyzed 1,887 reported drift-off crashes to examine the nature of this type of freeway incident. In compiling the database, they only

reviewed crashes during rainy and dry weather and excluded crashes on icy or snowy roads. Because of the national interest in drivers using cell phones, researchers further reviewed the 55 distracted crashes that occurred during 2000 and 2001 to identify the cause of the distraction. Cell phone usage in this study accounted for only 6 of these crashes (11 percent), most of which involved physical interaction with the phone, not the distraction of conversation.

Level of Evidence – IV

Recommendation: Need additional evaluation

Citation: Griffith M. Safety evaluation of rolled-in continuous shoulder rumble strips installed on freeways. Transportation Research Record. 1999;1665: 28-34.

Policy/Enforcement Strategies



Cell phone bans

State-level panel data, was examined to determine the effect of cellphone laws on fatal crashes in the United States between 2000 and 2010.¹⁴ Results show that there is insufficient power to detect a reduction in overall fatal crash rates scaled by vehicle miles and population estimates. Cellphone bans, however, have significantly reduced the fatal crash rates of drivers in certain age cohorts. The effect was most pronounced among drivers between 18 and 34 years of age. There were no finding to show any significant effect among drivers in the 55 and older age cohorts.

Level of Evidence – V

Recommendation: Need additional evaluation

Citation: Lim, S. & Chi, J. Cellphone bans and fatal motor vehicle crash rates in the United States J Public Health Pol (2013) 34: 197. doi:10.1057/jphp.2013.3.

GRADE: LOW (RED): These strategies have been evaluated and have been shown to be ineffective and/or harmful.



Motivational counseling/intervention with exposure to trauma room

This study found that despite fewer police charges at 6 months the combined MI group reported (1) significantly more hazardous drinking and (2) a greater amount of speeding and distracted driving than the control group over this same 6-month period.¹⁵

Level of Evidence – III

Recommendation: Do Not Use (Undesirable effects clearly outweigh desirable)

Citation: Accid Anal Prev. 2013 Apr;53:89-99. doi: 10.1016/j.aap.2013.01.006. Epub 2013 Jan 16. Motivational counseling reduces future police charges in court referred youth. Nirenberg T¹, Baird J, Longabaugh R, Mello MJ.

GRADE: VERY LOW (GRAY) The evaluation is weak. There needs to be additional research and evaluation.

Policy/Enforcement Strategies



Laws prohibiting all cell phone use

This study was conducted to determine which distracted driving laws were associated with decreased texting while driving among U.S. teenage drivers. Data from the 2013 Youth Risk Behavior Surveillance System survey were merged with states' distracted driving legislation. The prevalence of texting while driving was assessed for different laws using log-binomial regression. Approximately 39.0% of students reported texting while driving at least once in the 30 days before survey. Compared to states with universal texting bans along with young driver all cellphone bans, the adjusted ratio of texting while driving was 0.94 (95% confidence interval [CI], 0.77-1.16) in states with no bans, 1.33 (95% CI, 1.11-1.58) for young driver bans only, 1.24 (95% CI, 1.00-1.52) in states with bans for young drivers but no young driver all cellphone bans, and 0.89 (95% CI, 0.66 -1.19) in states with universal texting bans. The prevalence of texting was 28% less in states with delays of full licensure for texting offenses (prevalence ratio =0.72; 95% CI, 0.59-0.88). The study concluded that universal texting bans along with young driver all cellphone bans may be more effective in reducing texting while driving. Delays of full licensure may dissuade young drivers from texting and driving.¹⁶

Level of Evidence – VI

Recommendation: Need well-designed evaluation

Citation: Rudisill TM, Zhu M. The association between states texting regulations and the prevalence of texting while driving among U.S. high school students Ann Epidem 2015; 25(12) 888-93



High-visibility enforcement of cell phone laws with public awareness campaign

High-visibility enforcement (increased police presence supported by paid and earned media) was implemented in the Sacramento area of California and in Delaware in support of laws banning the use of handheld cell phones while driving. Three waves of enforcement were conducted from November 2012 to June 2013. Paid and earned media featured the tagline, *Phone in One Hand, Ticket in the Other*. The program evaluation included analyzing media and enforcement activity data, administering an awareness survey, conducting roadside observations of driver electronic device use, and analyzing crash data. Crash data analyses did not reveal any apparent effect on the incidence of distraction-related crashes in the same periods. This is likely due to the overall small percentage of crashes coded as distraction-related. Driver surveys showed

an increase in awareness that cell phone laws were being enforced. Observed handheld driver cell phone use dropped by one-third from 4.1 percent to 2.7 percent in California (a 34% reduction); and from 4.5 percent to 3.0 percent in Delaware (a 33% reduction).¹⁷

Level of Evidence – VI

Recommendation: Need well-designed evaluation

Citation: Chaundhary NK, Connolly J, Tison J, Solomon M, & Elliott K. (2015, January Evaluation of the NHTSA distracted driving high-visibility enforcement demonstration projects in California and Delaware. (Report No. DOT HS812108). Washington, DC. National Highway Traffic Safety Administration.



High-visibility enforcement of cell phone laws with public awareness campaign

The National Highway Traffic Safety Administration initiated distracted driving programs in Connecticut and New York utilizing the high-visibility enforcement model (HVE). The HVE model combines dedicated law enforcement during a specified period, paid and earned media that emphasizes an enforcement-based message, and evaluation before and after. NHTSA conducted observations of driver cell phone use and collected public awareness surveys at driver licensing offices in each test and comparison site.

The percentage of drivers observed holding their phones to their ears decreased from baseline to the end of the fourth wave in Hartford and the Connecticut control sites. The reduction was significantly greater in Hartford (from 6.8% to 2.9%) than the control site (from 6.6% to 5.6%). These changes represent a 57% drop in observed cell phone use for the Hartford site compared to a 15% drop at the control site.

Analysis of pre- to post- observations for each wave (e.g., pre-Wave 1 versus post-Wave 1, pre-Wave 2 versus post-Wave 2) indicated that the changes in the control areas were not significant. In contrast, analysis of each of these pre- to post-wave comparisons for Hartford indicated a significant reduction in observed hand-held cell phone use. Drivers estimated to be between the ages of 25 to 59 accounted for most of the decrease in observed hand-held cell phone use in the Hartford area. The overall change in observed headset use was significant in both the Hartford and control areas. Observed headset use significantly decreased in the Hartford area (3.5% to 1.3%) and in the control area (4.1% to 2.0%).

Fewer drivers in Syracuse were observed holding cell phones to their ears at the end of the fourth wave (from 3.7% to 2.5%) and this 32% decrease was statistically significant. In the control site, there was also a significant 40% reduction in observed hand-held cell phone use from 5.0% to 3.0%. In Syracuse, drivers estimated to be between the ages of 25 to 59 accounted for most of the decrease in hand-held cell phone use.¹⁸

Level of Evidence – VI

Recommendation: Need well-designed evaluation

Citation: Cosgrove L, Chaundhary N, Reagon I. "Four High-Visibility Enforcement Demonstration Waves in Connecticut and New York Reduce Hand-Held Phone Use," NHTSA 2011



State all-driver distracted driving laws and high school students' texting while driving behavior

This study examined effects of different all-driver distracted driving laws on texting while driving among high school students.¹⁹

Methods: High school student data were extracted from the 2013 National Youth Risk Behavior Survey. Distracted driving law information was collected from the National Conference of State Legislatures. The final sample included 6,168 high school students above the restricted driving age in their states and with access to a vehicle. Logistic regression was applied to estimate odds ratios of laws on texting while driving.

Results: All-driver text messaging bans with primary enforcement were associated with a significant reduction in odds of texting while driving among high school students (odds ratio = 0.703; 95% confidence interval, 0.513–0.964), whereas all-driver phone use bans with primary enforcement did not have a significant association with texting while driving (odds ratio = 0.846; 95% confidence interval, 0.501–1.429).

Conclusions: The findings indicate that all-driver distracted driving laws that specifically target texting while driving as opposed to all types of phone use are effective in reducing the behavior among high school students.

Level of Evidence – VI

Recommendation: Need well-designed evaluation

Citation: Qiao N, Bell TM. State all-driver distracted driving laws and high school students' texting while driving behavior. *Traffic Injury Prevention*. Volume 17, 2016; Issue 1. Published online: 04 June 2015.



Distracted driving law enforcement

Only one study has evaluated the effect of law enforcement directed specifically at distracted driving laws. Hartford, Connecticut, and Syracuse, New York, participated in a NHTSA demonstration program of cell phone and texting law enforcement. Three waves of high-visibility enforcement and publicity activities were conducted in 2010 and a fourth was conducted in spring 2011. Immediately after the second wave, observed

cell phone use dropped 56% in Hartford and 38% in Syracuse; observed texting while driving dropped 68% in Hartford and 42% in Syracuse. Experience with similar short-term high-visibility enforcement campaigns directed at impaired driving and seat belt use suggests that the effects often diminish over time unless the campaign is repeated periodically.²⁰

Level of Evidence – VI

Recommendation: Need well-designed evaluation

Citation: Cosgrove, L, Chaudhary, N., & Roberts, S. (2010). High Visibility Enforcement Demonstration Programs in Connecticut and New York Reduce Hand-Held Phone Use. DOT HS 811 376. Washington, DC: National Highway Traffic Safety Administration.

Environmental Strategies



Center line rumble strips

Persaud et al. (2004) studied centerline rumble strips on rural two-lane roads in seven states and concluded that they reduced all injury crashes by 14% and frontal and sideswipe crashes by 25%. Overall results indicated significant reductions for all injury crashes combined (14%, 95% confidence interval (95% CI) = 5-23%) as well as for frontal and opposing-direction sideswipe injury crashes (25%, 95% CI = 6-44%)--the primary target of centerline rumble strips.²¹

Level of Evidence – VI

Recommendation: Need well-designed evaluation

Citation: Persaud, B.N., Retting, R.A., & Lyon, C.A. (2004). Crash reduction following installation of centerline rumble strips on rural two-lane roads. *Accident analysis & Prevention* 36(6), 1073.

Educational Strategies



Computer-delivered driver safety behavior screening and intervention program initiated during an emergency department visit

Background: The purpose of the study was to (1) assess the feasibility of using a computer-assisted screening program to educate ED patients about risky driving behaviors, (2) evaluate patient acceptance of the computer-based traffic safety

educational intervention during an ED visit, and (3) assess postintervention changes in risky driving behaviors.²²

Methods: Pre/posteducational intervention involving medically stable adult ED patients in a large urban academic ED serving over 100,000 patients annually. Patients completed a self-administered, computer-based program that queried patients on risky driving behaviors (texting, talking, and other forms of distracted driving) and alcohol use. The computer provided patients with educational information on the dangers of these behaviors and data were collected on patient satisfaction with the program. Staff called patients 1 month post-ED visit for a repeat query.

Results: One hundred forty-nine patients participated, and 111 completed 1-month follow up (75%); the mean age was 39 (range: 21–70), 59 percent were Hispanic, and 52 percent were male. Ninety-seven percent of patients reported that the program was easy to use and that they were comfortable receiving this education via computer during their ED visit. All driving behaviors significantly decreased in comparison to baseline with the following reductions reported: talking on the phone, 30 percent; aggressive driving, 30 percent; texting while driving, 19 percent; drowsy driving, 16 percent; driving while multitasking, 12 percent; and drinking and driving, 9 percent.

Conclusions: Overall, patients were very satisfied receiving educational information about these behaviors via computer during their ED visits and found the program easy to use. At 1-month follow-up, patients reported a significant decrease in these behaviors. This study indicates that a low-intensity, computer-based educational intervention during an ED visit may be a useful approach to educate patients about safe driving behaviors and safe drinking limits and help promote behavior change. However, more evaluation and evidence is needed.

Level of Evidence – VI

Recommendation: Need well-designed evaluation

Citation: [Murphy M](#), [Smith L](#), [Palma A](#), [Lounsbury D](#), [Bijur P](#), [Chambers P](#), [Gallagher EJ](#). Feasibility of a computer-delivered driver safety behavior screening and intervention program initiated during an emergency department visit. *Traffic Inj Prev*. 2013;14(1):39-45. doi: 10.1080/15389588.2012.690545.



High School/Hospital Educational Program

This collaborative intervention consisted of two separate phases. In Phase 1, small groups of high school student leaders participated in a half-day interactive educational session in a pediatric hospital. Pre- and post-follow-up surveys were administered to this group. In Phase 2, these same students took the lessons they learned from the hospital to plan and implement a yearlong peer-to-peer campaign that focused on a clear "no texting while driving" message at their schools. Two unannounced driver observations were conducted to evaluate the effectiveness of the pilot program.

Sixty-one high school students participated in Phase 1. Self-reported texting while driving rates decreased significantly among the participants after Phase 1. Two schools were recruited to participate in Phase 2. Unannounced driver observations were conducted before the campaign and toward the end of the campaign. Post-intervention, there was a significant decrease in the percentage of drivers who texted while driving.²³

Level of Evidence – VI

Recommendation: Need well-designed evaluation

Citation: A pilot hospital-school educational program to address teen motor vehicle safety. [Unni P, Morrow SE, Shultz BL, Tian TT. J Trauma Acute Care Surg. 2013 Oct;75\(4 Suppl 3\):S285-9. doi: 10.1097/TA.0b013e31828f9aa4.](#)



Public Service Announcements

OBJECTIVE: To examine the inclusion of health behavior theory in distracted driving PSAs on YouTube.com.

METHODS: Two-hundred fifty PSAs were assessed using constructs from 4 prominent health behavior theories. A total theory score was calculated for each video. Multiple regression analysis was used to identify factors associated with higher theory scores.

RESULTS: PSAs were generally lacking in theoretical content. Video length, use of rates/statistics, driving scenario depiction, and presence of a celebrity were positively associated with theory inclusion.²⁴

CONCLUSION: Collaboration between health experts and PSA creators could be fostered to produce more theory-based distracted driving videos on YouTube.com.

Level of Evidence – VI

Recommendation: Need well-designed evaluation

Citation: [Steadman M¹, Chao MS, Strong JT, Maxwell M, West JH. C U L8ter: YouTube distracted driving PSAs use of behavior change theory. Am J Health Behav. 2014 Jan;38\(1\):3-12. doi: 10.5993/AJHB.38.1.1.](#)

Technology Strategies



Cell Phone Filter/Blocker

Two custom applications were designed to be installed on the employer-provided phones of 44 Michigan Department of Transportation employees who volunteered to participate in this study. The participants in the study all do work-related driving. This sample of licensed drivers include employees who regularly drive as part of their employment, and conduct regular business communications using cellular phones provided by their employer. The applications were designed to both block phone use while driving, and also to monitor and record phone use whether in the blocking state or not. One application, referred to as the Software-Only solution, used the phone's GPS to determine the speed at which the phone was moving. The other application, the Hardware/Software solution, wirelessly transmitted the speed of the vehicle to the phone from the on-board diagnostic port of the vehicle through Bluetooth. In either case, when the software loaded on the phone received information that the phone was traveling faster than the pre-set speed threshold, phone activity was blocked.

Data was collected for 9 weeks for each participant. During the first and last 3 weeks, the blocking application was inactive, and simply monitored phone use while running in the background (and not restricting any phone use). During the middle 3 weeks, the software became active, and if it received information that the phone was moving faster than the pre-set speed threshold, phone use was blocked. This included all calling, text messaging, and other interactions with the phone. During the blocking period, participants were allowed to override the blocking for work purposes by entering a short password. At the completion of the sixth week (after the blocking became inactive) each participants was asked to complete an online questionnaire regarding experience with the application.

- Participants answered fewer incoming calls at non-zero speeds during the blocking period.
- Participants placed outgoing calls at lower speeds during the blocking period.
- Participants placed more calls at zero speed during the blocking period.
- Participants overall were neutral in their responses when asked if they received safety benefits from the cell phone filtering/blocking applications.
- The only evidence of participants “gaming” the program was found in 2 participants responses in which they indicated that they gave out their personal phone numbers in order to receive incoming calls while driving when they knew that their work phones would be blocked.
- Very little was seen in the form of positive lasting effect after the applications went back into monitoring-only mode in the last 3 weeks, as no significant differences were found in their behaviors from the first monitoring period to the second monitoring period. Additionally, participants disagreed that they used the phones less in their personal vehicles after this experience.²⁵

Level of Evidence – VI

Recommendation: Need well-designed evaluation

Citation: Funkhouser, D., & Sayer, J. R. (2013, December). Cell phone filter/blocker technology field test. (Report No. DOT HS 811 863). Washington, DC: National Highway Traffic Safety Administration.



Cell Phone Filter/Blocker

Methods: The Minnesota Teen Driver Study incorporated cellular phone blocking functions via a software application for 182 novice teen drivers in two treatment conditions. The first condition included 92 teens who ran a driver support application on a smartphone that also blocked phone usage. The second condition included 90 teens who ran the same application with phone blocking but which also reported back to parents about monitored risky behaviors (e.g., speeding). A third control group consisting of 92 novice teen drivers had the application and phone-based software installed on the phones to record cellular phone (but not block it) use while driving.

Results: The two treatment groups made significantly fewer calls and texts per mile driven compared to the control group. The control group data also demonstrated a higher propensity to text while driving rather than making calls.

Discussion: Software that blocks cellular phone use (except 911) while driving can be effective at mitigating calling and texting for novice teen drivers. However, subjective data indicates that some teens were motivated to find ways around the software, as well as to use another teen's phone while driving when they were unable to use theirs.²⁶

Level of Evidence – VI

Recommendation: Need well-designed evaluation

Citation: Creaser JI, Edwards CJ, Morris NL, Donath M. Are cellular phone blocking applications effective for novice teen drivers? *J Safety Res.* 2015 Sept;54:75-8. Doi: 10.1016/j.jsr.2015.06.014. Epub 2015 July 29.



Systems Approach to the Management of Distracted Driving

Distracted driving is acknowledged universally as a large and growing road safety problem. Compounding the problem is that distracted driving is a complex, multifaceted issue influenced by a multitude of factors, organizations and individuals. As such, management of the problem is not straightforward. Numerous countermeasures have been developed and implemented across the globe. The vast majority of these measures have derived from the traditional reductionist, driver-centric approach to distraction and have failed to fully reflect the complex mix of actors and components that give rise to drivers becoming distracted. An alternative approach that is gaining momentum in road safety is the systems approach, which considers all components of the system and their interactions as an integrated whole. In this paper, we review the current knowledge base on driver distraction and argue that the systems approach is not currently being realized in practice. Adopting a more holistic, systems approach to distracted driving will not only improve existing knowledge and interventions from the

traditional approach, but will enhance our understanding and management of distraction by considering the complex relationships and interactions of the multiple actors and the myriad sources, enablers and interventions that make up the distracted driving system. It is only by recognizing and understanding how all of the system components work together to enable distraction to occur, that we can start to work on solutions to help mitigate the occurrence and consequences of distracted driving.²⁷

Level of Evidence – VII

Recommendation: Need well-designed evaluation

Citation: Young KL, Salmon PM. Sharing the responsibility for driver distraction across road transport systems: A systems approach to the management of distracted driving. Accident Analysis & Prevention; Volume 74, January 2015, Pages 350–359.



Reviews from Expert Panels

The American College of Preventive Medicine (ACPM) has provided a set of recommendations designed to reduce the morbidity and mortality associated with distractions due to texting while driving. According to the National Highway Traffic Safety Administration, 12% of all fatal crashes involving at least one distracted driver are estimated to be related to cell phone use while driving. Given the combination of visual, manual, and cognitive distractions posed by texting, this is an issue of major public health concern for communities. Therefore, the ACPM feels it is timely to discuss this issue and provide the following recommendations:²⁸

1. Encourage state legislatures to develop and pass legislation banning texting while driving, while simultaneously implementing comprehensive and dedicated law enforcement strategies including penalties for these violations. Legislatures should establish a public awareness campaign regarding the dangers of texting while driving as an integral part of this legislation.
2. Promote further research into the design and evaluation of educational tools regarding texting while driving that can be incorporated into the issuance of driver's licenses.
3. Provide primary care providers with the appropriate tools to educate patients of all ages.
4. Conduct additional studies investigating the risks associated with cell phone usage while driving, particularly texting, with motor vehicle crashes.

Level of Evidence – VII

Recommendation: Need well-designed evaluation

Citation: [Sherin KM](#), [Lowe AL](#), [Harvey BJ](#), [Leiva DF](#), [Malik A](#), [Matthews S](#), [Suh R](#); Preventing texting while driving: a statement of the American College of Preventive Medicine. Am J Prev Med. 2014 Nov;47(5):681-8. doi: 10.1016/j.amepre.2014.07.004. Epub 2014 Sep 10.

No published studies were identified that had evaluated the following activities:

- Pledges not to text while driving
- Information on distracted driving as a required component of driver education
- Communication and informational campaigns about the dangers of texting while driving

References

1. National Center for Injury Prevention and Control. Web-based Injury Statistics Query and Reporting System (WISQARS), 2014 Fatal Injury Data. Atlanta, GA: Centers for Disease Control and Prevention. [cited 23 December 2015].
<http://www.cdc.gov/injury/wisqars/>.
2. Centers for Disease Control and Prevention (CDC). Distracted Driving.
http://www.cdc.gov/motorvehiclesafety/distracted_driving/. Accessed 18 December 2015.
3. University of Michigan Transportation Research Institute (UMTRI). "Reducing Teen Driver Distraction: Parents Play Important Role." *UMTRI Research Review*. October-December 2012. 43(4): 1-2. Available from:
http://www.umtri.umich.edu/content/rr_43_4.pdf. Accessed 23 December 2015.
4. AAA Foundation for Traffic Safety. *2014 Traffic Safety Culture Index*. Washington, DC: AAA Foundation for Traffic Safety; January 2015. [cited 17 December 2015].
5. U.S. Department of Transportation. National Highway Traffic Safety Administration. Traffic Safety Facts. Distracted Driving 2014. Washington, DC. April 2016.
6. Melnyk & Fineout-Overholt. "*Evidence-based Practice in Nursing & Healthcare: A Guide to Best Practice*." 2005.
7. U.S. Department of Transportation. National Highway Traffic Safety Administration. Volpe. Available from URL: <https://www.volpe.dot.gov/content/infographic-motor-vehicle-crash-avoidance>. Accessed: January 17, 2017.
8. U.S. Department of Transportation. National Highway Traffic Safety Administration. NPRM Fact Sheet. Available from URL:
https://icsw.nhtsa.gov/safecar/v2v/pdf/V2V_NPRM_Fact_Sheet_121316_v1.pdf Accessed: January 17, 2017.
9. Peek-Asa C, Cavanaugh JE, Yang J, Chande V, Young T, Ramirez M. Steering teens safe: a randomized trial of a parent-based intervention to improve safe teen driving. *BMC Public Health* 2014;14:777. DOI: 10.1186/1471-2458-14-777. Published: 31 July 2014
10. Ramirez, Marizen; Yang, Jingzhen; Young, Tracy; Roth, Lisa; Garinger, Anne; Snetselaar, Linda; Peek-Asa, Corinne. Implementation Evaluation of "Steering Teens Safe": Engaging Parents to Deliver a New Parent-Based Teen Driving Intervention to Their Teens. *Health Education & Behavior*, v40 n4 p426-434 Aug 2013.
11. Rohl A, Eriksson S, Metcalf D. Evaluating the Effectiveness of a Front Windshield Sticker Reminder in Reducing Texting while Driving in Young Adults. *Cureus*. 2016 Jul; 8(7): e691. Published online 2016 Jul 14. doi: [10.7759/cureus.691](https://doi.org/10.7759/cureus.691)
12. Sayed, T., P. deLeur, J. Pump. "Impact of Rumble Strips on Collision Reduction on BC Highways: A Comprehensive Before and After Safety Study." TRB 89th Annual Meeting Compendium of Papers CD-ROM. Washington, D.C. 2010.
13. Griffith M. Safety evaluation of rolled-in continuous shoulder rumble strips installed on freeways. *Transportation Research Record*. 1999;1665: 28-34.
14. Lim, S. & Chi, J. Cellphone bans and fatal motor vehicle crash rates in the United States *J Public Health Pol* (2013) 34: 197. doi:10.1057/jphp.2013.3.

15. [Nirenberg T](#), [Baird J](#), [Longabaugh R](#), [Mello MJ](#). Motivational counseling reduces future police charges in court referred youth. *Accid Anal Prev*. 2013 Apr;53:89-99. doi: 10.1016/j.aap.2013.01.006. Epub 2013 Jan 16.
16. Rudisill TM, Zhu M. The association between states texting regulations and the prevalence of texting while driving among U.S. high school students *Ann Epidem* 2015; 25(12) 888-93
17. Chaundhary NK, Connolly J, Tison J, Solomon M, & Elliott K. (2015, January Evaluation of the NHTSA distracted driving high-visibility enforcement demonstration projects in California and Delaware. (Report No. DOT HS812108). Washington, DC. National Highway Traffic Safety Administration.
18. Cosgrove L, Chaundhary N, Reagon I. "Four High-Visibility Enforcement Demonstration Waves in Connecticut and New York Reduce Hand-Held Phone Use," NHTSA 2011
19. Qiao N, Bell TM. State all-driver distracted driving laws and high school students' texting while driving behavior. *Traffic Injury Prevention*. Volume 17, 2016; Issue 1. Published online: 04 June 2015.
20. Cosgrove, L, Chaudhary, N., & Roberts, S. (2010). High Visibility Enforcement Demonstration Programs in Connecticut and New York Reduce Hand-Held Phone Use. DOT HS 811 376. Washington, DC: National Highway Traffic Safety Administration.
21. Persaud, B.N., Retting, R.A., & Lyon, C.A. (2004). Crash reduction following installation of centerline rumble strips on rural two-lane roads. *Accident analysis & Prevention* 36(6), 1073
22. [Murphy M](#), [Smith L](#), [Palma A](#), [Lounsbury D](#), [Bijur P](#), [Chambers P](#), [Gallagher EJ](#) Feasibility of a computer-delivered driver safety behavior screening and intervention program initiated during an emergency department visit. *Traffic Inj Prev*. 2013;14(1):39-45. doi: 10.1080/15389588.2012.690545.
23. [Unni P](#), [Morrow SE](#), [Shultz BL](#), [Tian TT](#). *J Trauma Acute Care Surg*. A pilot hospital-school educational program to address teen motor vehicle safety. 2013 Oct;75(4 Suppl 3):S285-9. doi: 10.1097/TA.0b013e31828f9aa4.
24. [Steadman M](#)¹, [Chao MS](#), [Strong JT](#), [Maxwell M](#), [West JH](#). C U L8ter: YouTube distracted driving PSAs use of behavior change theory. *Am J Health Behav*. 2014 Jan;38(1):3-12. doi: 10.5993/AJHB.38.1.1.
25. Funkhouser, D., & Sayer, J. R. (2013, December). Cell phone filter/blocker technology field test. (Report No. DOT HS 811 863). Washington, DC: National Highway Traffic Safety Administration.
26. Creaser JI, Edwards CJ, Morris NL, Donath M. Are cellular phone blocking applications effective for novice teen drivers? *J Safety Res*. 2015 Sept;54:75-8. Doi: 10.1016/j.jsr.2015.06.014. Epub 2015 July 29.
27. Young KL, Salmon PM. Sharing the responsibility for driver distraction across road transport systems: A systems approach to the management of distracted driving. *Accident Analysis & Prevention*; Volume 74, January 2015, Pages 350–359.
28. [Sherin KM](#), [Lowe AL](#), [Harvey BJ](#), [Leiva DF](#), [Malik A](#), [Matthews S](#), [Suh R](#); Preventing texting while driving: a statement of the American College of Preventive Medicine. *Am J Prev Med*. 2014 Nov;47(5):681-8. doi: 10.1016/j.amepre.2014.07.004. Epub 2014 Sep 10.