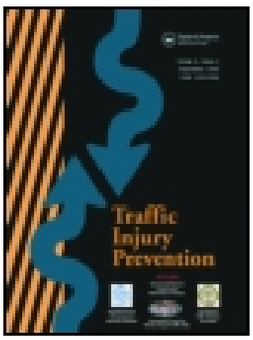

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Underutilized strategies in traffic safety: Results of a nationally representative survey

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ABSTRACT

Objective: Numerous strategies proven to be effective in reducing crash fatalities have been underutilized in the United States, including sobriety checkpoints; automated enforcement; lower blood alcohol concentration (BAC) limits; primary enforcement of safety belt and motorcycle helmet use laws; alcohol ignition interlock installations; drugged driving screening; lowered residential speed limits; and roundabout installations. If these strategies are implemented widely in every state, traffic fatalities could be reduced by at least 50%. A barrier to implementation is the perception by officials that the public is against them. The purpose of this study was to determine which of these underutilized measures would be favorable to the American public given that they are educated on the research of their effectiveness.

Methods: A representative survey of 2,000 U.S. drivers was conducted in October 2018 with 30 questions about these underutilized strategies using the National Opinion Research Center's (NORC) AmeriSpeak® survey instrument. Our objective was to gauge the public's opinion of these strategies when they are aware of the research on their effectiveness.

Results: Respondents were given a summary of the research on the effectiveness of these strategies and then asked whether they were in favor of them in their communities; 64.7% of the respondents were in favor of conducting sobriety checkpoints at least monthly; 68.2% were in favor of police using passive alcohol sensors at sobriety checkpoints; 60.3% of respondents were in favor of using speed and red light cameras for automated enforcement; 70.1% were in favor of a law that required all cars to have seat belt reminders that continuously chime until the seat belt is buckled, including for rear seat passengers; and 62.5% were in favor of raising the fine in their state for not using a seat belt from $25 to $100. Other results indicated public support for these strategies.

Conclusions: The results indicate that when drivers in the United States are given facts about certain strategies to reduce crash fatalities, the majority are in favor of the underutilized strategies. This information could be useful to legislators and highway safety officials in their decisions to implement these strategies.

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Vision Zero; countermeasures; traffic fatalities; opinions

Introduction

In 2015, over 35,000 people were killed in traffic crashes in the United States (NHTSA 2017a), accounting for 1.3% of all deaths from all causes in the United States that year (Sivak and Schoettle 2017). That may seem like a small percentage, but European countries and Australia had much lower percentages in comparison (e.g., United Kingdom, 0.3%; Germany, 0.4%; Switzerland, 0.5%; France, 0.6%; Australia, 0.8%). About a third of the U.S. traffic crash fatalities are due to speeding (NHTSA 2017c), about a third are due to alcohol-impaired driving (NHTSA 2017d), with some overlap, and almost half of the drivers and passengers in cars who were killed were not wearing their seat belt (NHTSA 2017b).

The most current data in the United States indicate that 37,133 were people killed in crashes in 2017 and the number of urban fatalities was larger than the number of rural fatalities. The fatality rate per 100 million vehicle miles traveled was 1.16 in 2017. Safety improvements in vehicles including airbags and electronic stability control have contributed to a reduction in traffic fatalities over the past 10 years (NHTSA 2018b). However, numerous other strategies that have proven effective in reducing crash fatalities are underutilized.

Many countries around the world are committed to the vision of eliminating fatalities on their nations' roads. The Zero Deaths vision is a way of describing how a combination of strategies is going to affect safety: Toward Zero Deaths. The goal was first adopted by Sweden in 1997 and "Vision Zero" has evolved across the world and in many U.S. states. It uses a data-driven multidisciplinary approach involving highway design, vehicle safety features, and the integration of education, enforcement, engineering, and emergency medical services (Toward Zero Deaths Steering Committee 2015; www.TowardZeroDeaths.org).

In 2016, the National Safety Council established the "Road to Zero" coalition in partnership with the U.S. Department of

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Transportation's NHTSA, Federal Highway Administration, and Federal Motor Carrier Safety Administration. The goal is to get to zero deaths in the next 30 years (Toward Zero Deaths 2014). The coalition is focused on incorporating all of the initiatives from Toward Zero Deaths, Vision Zero, and other groups. Road to Zero is a collaboration of more than 900 individuals and traffic safety organizations working toward zero traffic fatalities by 2050. Road to Zero (National Safety Council 2019) expands the effort to include not only representatives of road, behavioral, and vehicle (Webb 2017; CDC 2019) safety but public health officials, technology companies, nonprofit groups, and others to develop a coordinated approach to highway safety and injury prevention.

Proven effective strategies have been substantially underutilized in the United States. The reasons for this vary, but lacking knowledge on their effectiveness could be a major factor. For example, the following strategies could substantially reduce traffic fatalities:

Sobriety checkpoints. Checkpoints are highly effective in deterring drinking and driving (Shults et al. 2001; Elder et al. 2002; Fell et al. 2004; Voas et al. 2005). Checkpoints are safer for both police and the public than individual traffic stops. Widespread use of checkpoints could reduce fatalities by at least 8%. In 2017, there were 10,874 fatalities in crashes involving drivers with a blood alcohol concentration (BAC) $\geq$0.08 g/dL (NHTSA 2018a). According to a survey by the Governors Highway Safety Association in 2011, only 38 states use sobriety checkpoints and only 12 states conduct them on a weekly basis. Using passive alcohol sensors (PASs) at checkpoints to detect drinking drivers would increase detection of drinking drivers by 50% (Ferguson et al. 1995). A PAS analyzes air from in front of the suspect's face and does not require the suspect to use a mouthpiece or to blow into the device; therefore, PAS use is not considered a search (Voas et al. 2005; Voas and Fell, 2013).

Automated enforcement: Speed cameras/red light cameras. Speed and red light cameras are highly effective in reducing speeding and red light running (Insurance Institute for Highway Safety 2018). However, they are only used in a few U.S. communities. Congress will not allow federal grant funding for their use. Studies show that they could reduce fatalities in the United States by 19% (Transportation Research Board [TRB] 1998; Retting and Farmer 2003; Retting, Farmer, et al. 2008; Retting, Kyrychenko, et al. 2008). In a recent survey, almost 43% of drivers admitted driving through a red light when they could have stopped safely in the past 30 days (AAA Foundation for Traffic Safety 2017).

Lowering the BAC limit for driving to 0.05 g/dL. Studies in Australia and Europe show that lowering the BAC to 0.05 could reduce traffic fatalities by 11% (Fell and Scherer 2017). Administrative sanctions (license suspension, fine) could be used for drivers with BACs = 0.05–0.07 (highly effective in Canada; Fell et al. 2016).

Primary safety belt and motorcycle helmet use laws. Primary safety belt laws result in a 91% seat belt usage rate (in 34 states and the District of Columbia) compared to a 79% usage rate in states with secondary laws (16 states). The use of seat belts saved 14,000 lives in 2015 (NHTSA 2017a). An additional 2,800 lives would have been saved if all occupants in crashes were wearing a safety belt. We defined primary enforcement as allowing police to stop a vehicle if a driver is not wearing a seat belt and issue a citation (Nichols et al., 2014). Motorcycle helmet laws saved 1,859 lives in 2016 and an additional 802 lives could have been saved if all motorcyclists had worn helmets, but only 20 states have such laws (NHTSA 2018c).

Alcohol ignition interlock installations. All states have alcohol ignition interlock device laws. Studies show that all offender laws are associated with a 16% reduction in drinking driver fatal crashes (Teoh et al. 2018). Yet in the best states, only 50% of eligible offenders actually install the device on their cars. Loopholes in the laws should be closed to improve effectiveness.

Oral fluid screening for drugged driving. Roadside surveys on weekend nights indicate that about 16–20% of drivers have impairing drugs in their systems (Kelley-Baker et al. 2017). Australia uses an oral fluid drug screening device that can detect the presence of drugs in about 3 min (Pathtech Drugwipe 2). These need to be approved for use in the United States in order to detect and reduce drugged driving.

Lowering speed limits in residential areas. When communities lower speed limits in residential areas, pedestrian and bicyclist fatalities are reduced by as much as 25% (Teft 2011).

Highway engineering. Roundabouts that replace signalized intersections practically eliminate T-bone side collisions that can result in serious and fatal injuries. One study showed that roundabouts reduced crashes of all severities by 38% (Retting et al. 2001). Rumble strips on the road edge and the center line have been shown to keep drowsy drivers awake and avoid run-off-the-road and head-on collisions. One multistate study found significant crash modifications for run-off-road, head-on, and sideswipe-opposite-direction crashes due to rumble strips (Lyon et al. 2015).

Ridesharing. There are anecdotal reports that many would-be drinking drivers have switched to ridesharing to get them to and from drinking establishments. Providence College also studied the relationship between Uber, fatal crashes, and criminal arrests (Dills and Mulholland 2016). They examined over 150 cities and counties that introduced Uber between 2010 and 2013 and found that Uber was associated with decreases in fatal vehicular crashes and in arrests for driving under the influence, assaults, and disorderly conduct.

If implemented widely, these strategies could substantially reduce traffic fatalities.

Success stories

- In 1976 in Victoria, Australia, there were 1,061 traffic fatalities. In that year, random breath testing was implemented as an enforcement measure and has been used since. Random breath testing involves police randomly stopping vehicles and mandating a breath alcohol test from each driver. If the driver refuses, or if the BAC is $\geq$0.05 g/dL, the driver is charged with driving while intoxicated (DWI). Since 1976, traffic fatalities have been decreasing. In 2016, there were 291 fatalities, a 73% decrease (TRB 2010).
- In 2002 in France, the French president announced that road safety would be one of his priority initiatives in his new term of office. Political sponsorship at the highest level allowed for prompt action. Thousands of speed cameras were installed around the nation but especially in places where speed was a factor in fatal crashes. Due to speed cameras and impaired driving enforcement activities, traffic fatalities in France declined from 8,000 in 2002 to 4,000 in 2008, a reduction of 50% (TRB 2010).

- In 2006 in Edmonton, Alberta, Canada, there were 8,246 serious injuries and fatalities in traffic crashes, about half to pedestrians. After installing left turn–only green flashing arrows at 90 locations, modifying the angles of right turn lanes at 24 major intersections, implementing pedestrian crossing controls at 35 locations, and other roadway measures, serious injuries and fatalities declined to 3,396 in 2016, a 59% decrease (Vision Zero Edmonton 2017).

Any of the above strategies can be implemented in the United States. The cost may be significant, but the benefit-to-cost ratio would be substantial. In the United States, 102 people per day are killed in crashes on our roads, 4 deaths each hour, 1 death every 15 min of every day. Is that acceptable? We asked the American public about these underutilized strategies.

Objective

Public opinion of these strategies

Which of these underutilized measures would be favorable to the American public? A representative survey of 2,000 respondents was conducted in October 2018 with 30 questions about these underutilized strategies using the National Opinion Research Center (NORC) University of Chicago AmeriSpeak® survey instrument. Our objective was to gauge the public's opinion of these strategies after learning about their effectiveness.

Methods

Survey methods

NORC conducted the Underutilized Strategies in Traffic Safety Survey using NORC's AmeriSpeak Panel for the sample source. The main focus of the research was to ask adult drivers aged 18 and older about their opinions regarding various traffic safety strategies. This study was offered in English only by website and phone.

Sampling

A general population sample of U.S. adults aged 18+ was selected from NORC's AmeriSpeak Panel for this study. Survey respondents who indicated that they drove a car or motorized vehicle at some point during the past year met the screening criteria. The sample for a specific study is selected from the AmeriSpeak Panel using sampling strata based on age, race/Hispanic ethnicity, education, and gender (48 sampling strata in total). The size of the selected sample per sampling stratum is determined by the population distribution for each stratum. In addition, sample selection takes into account expected differential survey completion rates by demographic groups so that the set of panel members with a completed interview for a study is a representative sample of the target population. If the panel household has more than one active adult panel member, only one adult in the household is eligible for selection (random within-household sampling). Panelists selected for an AmeriSpeak study earlier in the business week are not eligible for sample selection until the following business week.

In the field

In total NORC collected 2,044 interviews, 1,818 by web mode and 226 by phone mode. To encourage study cooperation, NORC sent email and SMS reminders to sampled web-mode panelists once a week throughout data collection. To administer the phone survey, NORC dialed the sampled phone-mode panelists throughout the field period. In addition, AmeriSpeak web-mode panelists for whom AmeriSpeak had a phone number were called to encourage response. These web panelists were allowed to complete the survey via phone if convenient. Panelists were offered the cash equivalent of $3.00.

Statistical weighting

Statistical weights for the study-eligible respondents were calculated using panel base sampling weights to start. Panel base sampling weights for all sampled housing units are computed as the inverse of probability of selection from the NORC National Frame (the sampling frame that is used to sample housing units for AmeriSpeak) or address-based sample. The sample design and recruitment protocol for the AmeriSpeak Panel involves subsampling of initial nonrespondent housing units. These subsampled nonrespondent housing units are selected for an in-person follow-up. The subsample of housing units that are selected for the nonresponse follow-up have their panel base sampling weights inflated by the inverse of the subsampling rate. The base sampling weights are further adjusted to account for unknown eligibility and nonresponse among eligible housing units. The household-level nonresponse adjusted weights are then poststratified to external counts for number of households obtained from the Current Population Survey. Then, these household-level poststratified weights are assigned to each eligible adult in every recruited household. Furthermore, a person-level nonresponse adjustment accounts for nonresponding adults within a recruited household. Finally, panel weights are raked to external population totals associated with age, sex, education, race/Hispanic ethnicity, housing tenure, telephone status, and census division. The external population totals are obtained from the Current Population Survey. The weights adjusted to the external population totals are the final panel weights.

Study-specific base sampling weights are derived using a combination of the final panel weight and the probability of selection associated with the sampled panel member. Because not all sampled panel members respond to the survey interview, an adjustment is needed to account for and adjust for survey nonrespondents. This adjustment decreases potential nonresponse bias associated with sampled panel members who did not complete the survey interview for the study. Thus, the non-response-adjusted survey weights for the study are adjusted via a raking ratio method to general adult population totals associated with the following sociodemographic

characteristics: Age, sex, education, race/Hispanic ethnicity, and census division. The weights adjusted to the external population totals are the final study weights.

For example, 31.3% of the weighted sample were between the ages of 18 and 34; 24.2% were between 35 and 49 years of age; 24.4% were between 50 and 64; and 20.1% were 65 and older. Males comprised 47.9% of the weighted sample and 52.1% were female. Non-Hispanic whites accounted for 64.4% of the weighted sample; 10.6% were non-Hispanic black; 16.5% were Hispanic; 4.1% were non-Hispanic Asian/Pacific Islander; and 4.3% were non-Hispanic others. Concerning education status, 9.3% had less than high school; 27.6% had a high school equivalent; 29.0% had some college or an associate degree; 20.6% had a bachelor's degree; and 13.5% had a graduate degree. The percentage who had a household income of less than $34,999 was 27.3%; 36.3% had a household income of between $35,000 and $75,000; 23.3% had a household income between $75,000 and $99,999; and 13.1% were at $100,000 or above. For more information, visit AmeriSpeak.norc.org.

Results

Given a summary of the studies of the effectiveness of these strategies, below are the weighted percentages of respondents in favor of their utilization. The margin of error in these percentages is ±2.98%.

Sobriety checkpoints

Almost two thirds (64.7%) of the respondents were in favor of conducting sobriety checkpoints in their community at least monthly. Almost a third of the respondents (31.7%) said that checkpoints should be conducted every weekend. More than two thirds (68.2%) were in favor of police using passive alcohol sensors at sobriety checkpoints in their community.

Speeding

Three out of five (60.3%) of the respondents were in favor of using speed and red light cameras for automated enforcement in their community. Two thirds (65.2%) of females were in favor and 55.0% of males were in favor. Even those respondents who said that they speed often were in favor of speed cameras (54.3%), and those who reported running red lights were in favor of red light cameras (51.5%).

Alcohol-impaired driving

Almost 9 out of 10 (88.8%) respondents said that they had heard of BAC limits for driving and 88.7% felt that most drivers with a BAC of 0.08 or higher were a danger on the road. When asked whether they thought the BAC limit should be lowered to 0.05 in their state, 49.7% said yes and 49.3% said no; 54.1% of females were in favor while 44.8% of males were in favor. As would be expected, of those who reported drinking and driving, only 37.2% were in favor of lowering the BAC limit to 0.05. However, when asked whether the BAC limit should be lowered to 0.05 if the penalty would be administrative (license suspension, fine) and not criminal, overall 57.5% were in favor.

Seat belt usage

As most self-report surveys show, 84.9% of the respondents said that they wear a seat belt when driving on every trip. In addition, 82.4% of the respondents were in favor of a primary seat belt law in their state when primary enforcement and secondary enforcement were explained to them. That broke out to 87.2% for females and 77.2% for males. In addition, 70.1% were in favor of a law that required all cars to have seat belt reminders that continuously chime until the seat belt is buckled, including for rear seat passengers. Further, 62.5% were in favor of raising the fine in their state for not using a seat belt from $25 to $100. Of those respondents who reported not wearing a seat belt often, 44.6% were in favor of a seat belt law, 35.1% were in favor of seat belt reminders, and 32.2% were in favor of raising the seat belt fine.

Motorcycle helmets

Most of the respondents (85.7%) were in favor of a motorcycle helmet use law in their state that covers all ages. However, for those who reported that they often ride motorcycles ($n = 159$), 60.8% favored universal helmet laws.

Alcohol ignition interlock devices

A high percentage (82.5%) were in favor of requiring all convicted DWI offenders to install an ignition interlock device in their vehicles. In addition, 71.9% were in favor of alternative sanctions such as house arrest or an alcohol monitoring ankle bracelet for convicted DWI offenders who refuse ignition interlock devices. See Table 1 for a summary of these results.

Table 1. Percentage of respondents in favor of strategy (±2.98%).

Underutilized strategies in traffic safety	% in Favor
Sobriety checkpoints	
Conducted monthly	64.7
Conducted weekly	31.7
Conducted using passive alcohol sensors	68.2
Using speed and red light cameras	60.3
Respondents who speed often	54.3
Respondents who run red lights	51.5
Lower BAC limit for driving to 0.05 g/dL	49.7
Female respondents	54.1
Male respondents	44.8
Respondents who drink and drive	37.2
Administrative penalty, not criminal	57.5
Seat belt usage	
Primary enforcement seat belt law	82.4
Require seat belt use reminder chimes in car	70.1
Raising fine for not using seat belt from $25 to $100	62.5
Motorcycle helmet law	
Covering all ages	85.7
Respondents who ride motorcycles	60.8
Alcohol ignition interlock devices	
Require for all convicted DWI offenders	82.5
House arrest/alcohol monitoring for refusers	71.9

Table 2. Percentage of respondents in favor of strategy (±2.98%).

Underutilized strategies in traffic safety	% in Favor
Drugged driving	
Police using saliva screening devices for drugs	74.0
Respondents who drove after marijuana use	36.2
Speed limits	
Lowering speed limit by 5 mph in community	68.6
Highway engineering	
Roundabouts replacing intersections	72.9
Rumble strips in center and road edge	89.6
Ridesharing	
Respondents who had ridesharing	72.5
Respondents who used ridesharing	37.6
Used to avoid drinking and driving	60.4 (of those who used)
Respondents aged 18–35 who used ridesharing	
To avoid drinking and driving	75.6
Respondents aged 36 and older who used ridesharing	
To avoid drinking and driving	47.6

Drugged driving

Almost three quarters (74.0%) of respondents were in favor of police using saliva screening devices if they suspect that a driver at a traffic stop is impaired by drugs other than alcohol. However, of those who reported driving within 2 h of using marijuana, 36.2% were in favor of saliva screening.

Speed limits

Over two thirds (68.6%) were in favor of lowering the speed limits by 5 mph in their community if crash studies justify it.

Highway engineering

Close to three quarters (72.9%) of respondents were in favor of roundabouts replacing the most dangerous intersections in their community. In addition, 89.6% were in favor of more rumble strips on certain roads in their community to prevent crossing over the center or lane line.

Ridesharing

Close to 3 out of 4 (72.5%) said that they had ridesharing services such as Uber and Lyft in their community. In addition, 37.6% said they had used ridesharing within the past year. Of the respondents who reported using ridesharing, 60.4% said that they used ridesharing at least once in the past year to avoid drinking and driving. Of the 18- to 35-year-old respondents who used ridesharing, 75.6% used it at least once in the past year to avoid drinking and driving compared to 47.6% of respondents aged 36 and older. See Table 2 for a summary of these results.

The results of this survey indicate that when drivers in the United States are given facts about certain countermeasures or strategies to reduce traffic crash fatalities, the majority are in favor of the underutilized strategies if they have the potential to save lives.

Discussion

Over 80% of the survey participants were in favor of primary enforcement seat belt laws, motorcycle helmet use laws, alcohol ignition interlocks for those convicted of driving under the influence, and the installation of rumble strips on the side of roads to keep drivers from driving off the road. This should inform state legislatures that these laws and this roadway feature are viable in their state and are in favor of a vast majority of the public.

Seat belt reminders in vehicles, replacing dangerous intersections with roundabouts, screening drivers for drugs other than alcohol, and lowering speed limits by 5 mph in urban areas received a favorable opinion by approximately 70% of the participants. This should provide important support for their implementation.

One surprising finding was that 60% of the 70% who said that they used ridesharing used it at least once in the past year to avoid drinking and driving. If ridesharing continues to increase, this could have a significant effect on impaired driving.

Striking the best balance of effectiveness and popularity would be the 85.7% in favor of motorcycle helmet usage for all ages of riders. Laws in every state have the potential to reduce motorcycle crash fatalities substantially. Another combination of effectiveness and popularity is the 60.3% in favor of speed and red light cameras to improve enforcement in their communities. If these cameras were used on a widespread basis, a substantial number of lives could be saved.

One strategy that has been very effective in other countries is the lowering of the BAC limit for driving to 0.05 g/dL. Only 49.7% were in favor of doing that in their state and currently only Utah has adopted that legislation. Apparently the public needs more education on BAC limits and driving impairment.

There are also many other promising strategies that could also impact traffic fatalities (Peden et al. 2018; Sung et al. 2017). More research is needed on these strategies and then another survey should be conducted, but some of the strategies/technologies are available today, including the following:

> Installing guardrails to reduce the severity of run-off-the-road crashes.
>
> Developing and using new guidelines to reduce the risk of pedestrian fatalities.
>
> Enacting and enforcing bicycle helmet laws for all ages.
>
> Using seat belt use interlocks so that the vehicle will not drive unless every occupant uses the safety belts.
>
> Installing speed governors limiting how fast vehicles can drive (e.g., 80 mph).
>
> Developing and implementing evidence-based emergency vehicle operations standards.
>
> Installing the Driver Alcohol Detection System for Safety involving a passive alcohol reading via the driver's touch or breath before the vehicle can drive.
>
> Introducing autonomous vehicles (self-driving vehicles to eliminate human error).

There are dozens of other measures described in the publication "Toward Zero Deaths" (TowardZeroDeaths 2014) and in the TRB Report "Achieving Traffic Safety Goals in

the United States, Lessons from Other Countries (TRB 2010). For effective laws, see Advocates for Highway and Auto Safety (2017).

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