



INSURANCE INSTITUTE  
FOR HIGHWAY SAFETY

HIGHWAY LOSS  
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## Reducing Alcohol-impaired Driving: Can We Regain the Momentum?

[www.iihs.org](http://www.iihs.org)

Pennsylvania Safety Symposium  
Harrisburg, PA • June 10, 2014

Anne T. McCartt, PhD

## The Insurance Institute for Highway Safety,

founded in 1959, is an independent, nonprofit, scientific and educational organization dedicated to reducing the losses — deaths, injuries, and property damage — from crashes on the nation's highways.

## The Highway Loss Data Institute,

founded in 1972, shares and supports this mission through scientific studies of insurance data representing the human and economic losses resulting from the ownership and operation of different types of vehicles and by publishing insurance loss results by vehicle make and model.

Both organizations are wholly supported by auto insurers.

# Insurance Institute for Highway Safety

105 employees as of June 2014



Arlington, VA – headquarters

- 66 employees
  - Research & Communications (48)
  - Highway Loss Data Institute (18)

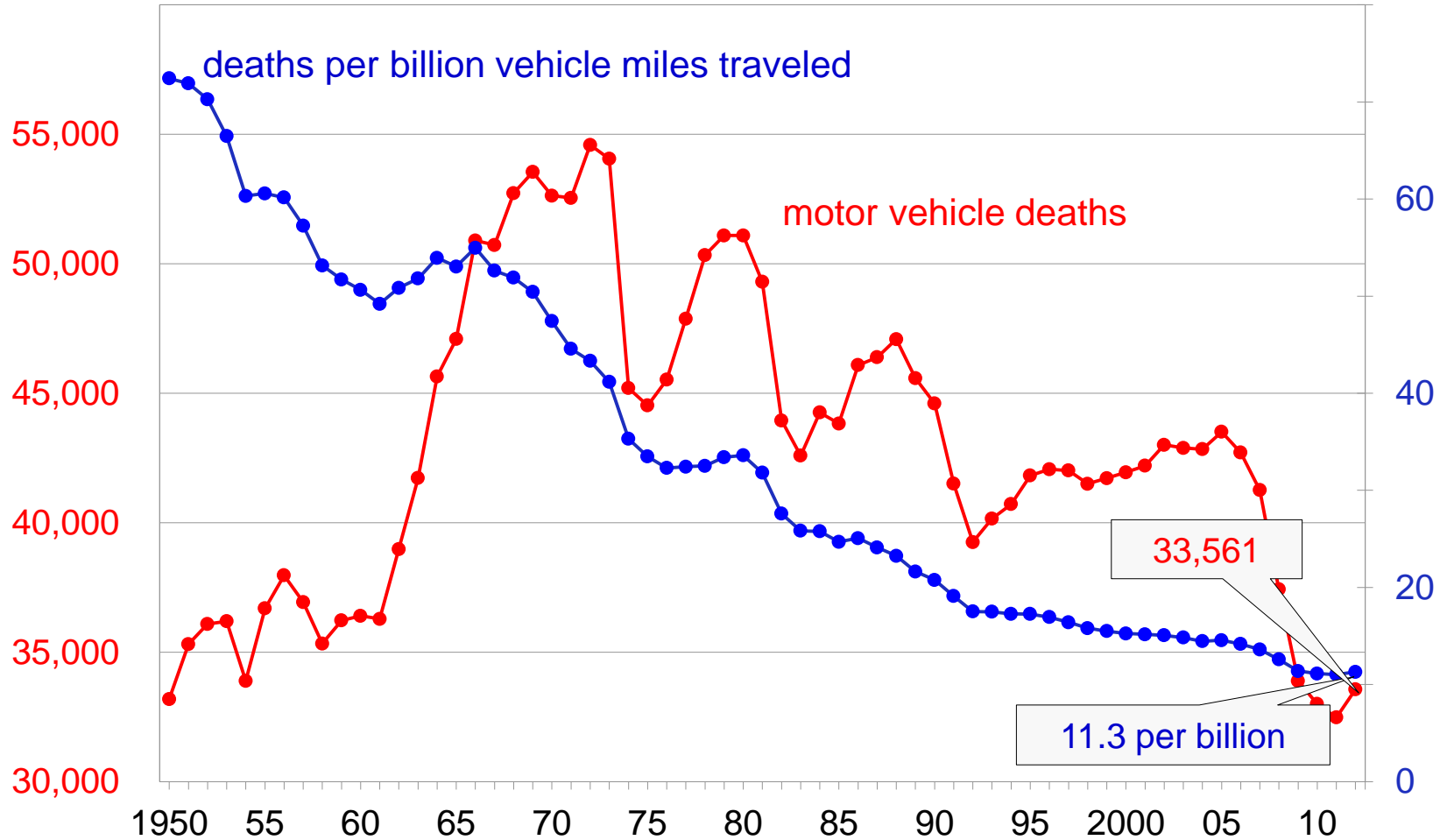


Ruckersville, VA – VRC

- 39 employees

# Motor vehicle crash deaths and deaths per billion vehicle miles traveled

1950-2012





What has contributed to declining crash death rates?

# 40 mph frontal offset crash test

1959 Chevrolet Bel Air and 2009 Chevrolet Malibu

The logo for the Insurance Institute for Highway Safety (IIHS) is centered on a black rectangular background. It features the words "INSURANCE INSTITUTE" in white, serif, all-caps font, positioned above a horizontal line. Below the line, the words "FOR HIGHWAY SAFETY" are written in white, serif, all-caps font, set against a solid blue rectangular background.

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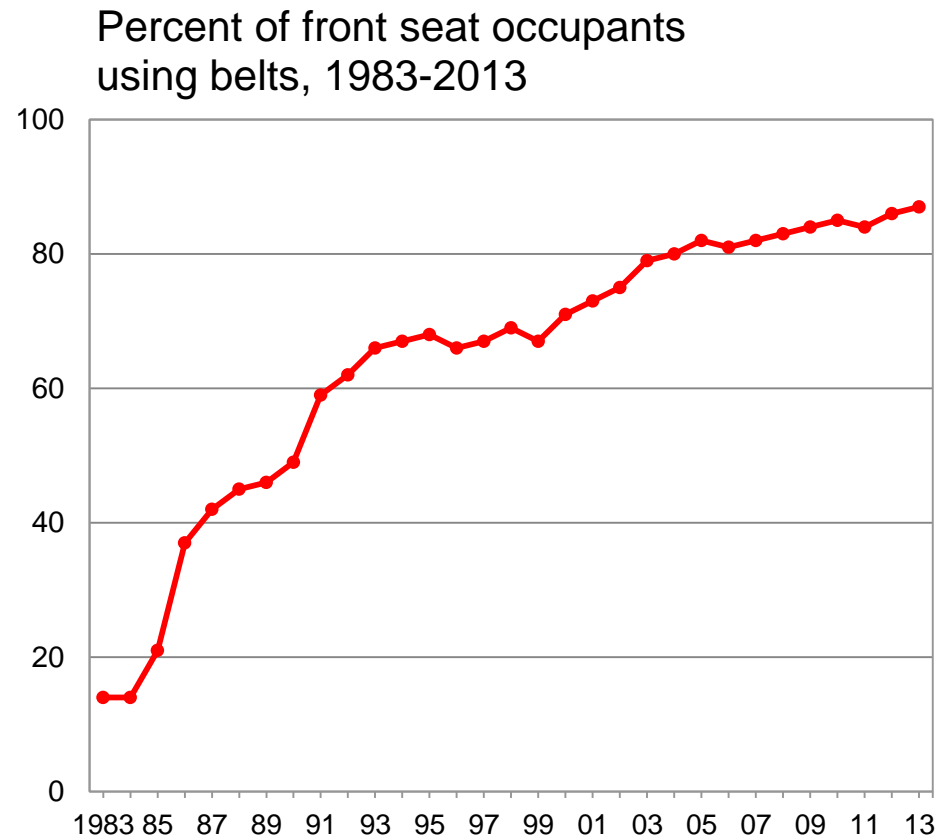
An aerial photograph of a roundabout intersection. Several cars are visible on the road, including a red car in the foreground and a white van. The roundabout is surrounded by green trees and grass. The image is slightly faded to allow text to be overlaid.

Almost one-quarter of crash deaths occur at intersections.

Conversion of stop sign and traffic signal intersections to roundabouts:

- 40 percent reduction in all crashes
- 80 percent reduction in injury crashes
- 90 percent reduction in fatal & incapacitating injury crashes

# Safety belts saved an estimated 12,174 lives in 2012; belt use has increased largely because of primary belt use laws and publicized enforcement



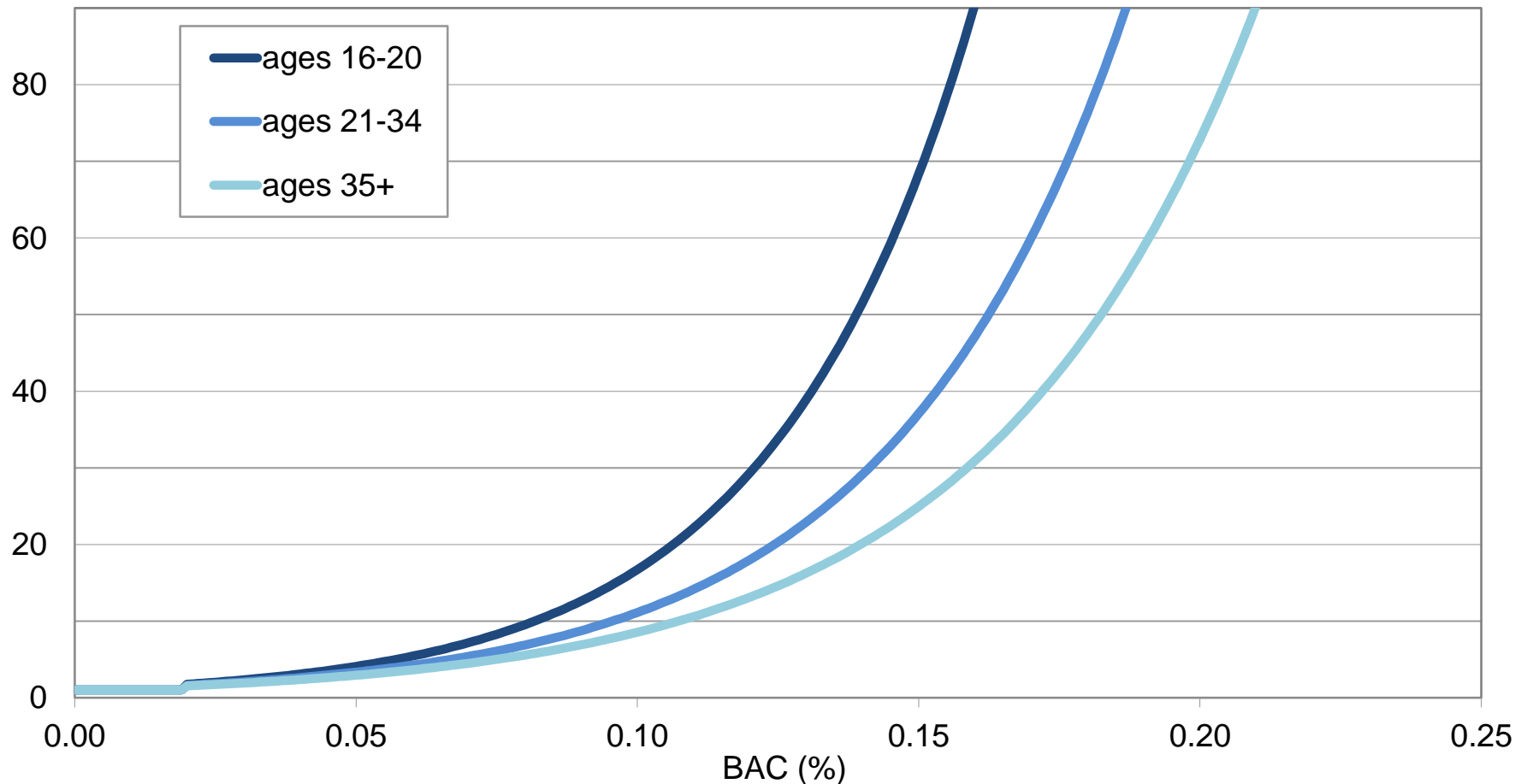




Progress has been more difficult  
in other areas

# Relative risk of fatal crash involvement at various BACs compared to zero BAC

Passenger vehicle drivers by age (Voas et al., 2012)



## 'Crackdown' On Drunks Found Ineffective

Chicago's recent, much-touted "crackdown" on drunk driving actually produced no reductions in that city's number of car-crash fatalities or drunk driving arrests, according to researchers. Claims of great effectiveness had been made for Chicago's "get tough" court actions against drunk drivers.

In a paper to be published in the *Law and Society Review*, three researchers have concluded that the decrease in Chicago's motor vehicle fatalities that occurred during the crackdown was "mistakenly" attributed to the drunk driving program by Chicago officials. In fact, they say, the reduction was well within the bounds of typical chance variation. In a compared city, Milwaukee, Wisc., the researchers found a similar reduction during the same period—even though Milwaukee was not being subjected to the anti-drunk driving campaign.

The authors of the research paper are Dr. Leon S. Robertson, senior behavioral scientist in the Insurance Institute for Highway Safety; Robert F. Rich, graduate student at the University of Chicago, and Dr. H. Laurence Ross, Professor of Law and Sociology, University of Denver. Their study was sponsored by the Institute.

The Chicago anti-drunk driving campaign was conducted during late December 1970 and the first half of 1971. In it, the city's traffic courts were told by the supervising judge, Raymond K. Berg, to

sentence persons convicted of driving while intoxicated to seven days in jail and to recommend to the secretary of state's office that their drivers' licenses be suspended for one year. The program was based on an assertion that the bulk of driving-while-intoxicated arrests were of social drinkers rather than "alcoholics," and that the seven-day jail sentences would deter them in the future from drinking amounts likely to involve them in fatal crashes.

The campaign received considerable, largely favorable press coverage. "There were at least 17 articles in Chicago newspapers and eight television news films" during the life of the crackdown, the researchers report.

In their study the three researchers point out that a "short-term change in a time series, such as the reduction in fatalities observed by Chicago officials" during the

### Inside

- NHTSA Staff—Not Public—Warned Of VW Wiper Hazard ... page 2
- Army Jeep Judged Too Hazardous For Public Use ... page 3
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- Safety Center Seeks Rules For Mini-Cars ... page 7

May 22, 1972

December 30, 2013

# Status Report

Insurance Institute for Highway Safety | Highway Loss Data Institute

Drop in weekend drinking and driving doesn't bring drop in fatal crashes involving alcohol

## Alcohol paradox

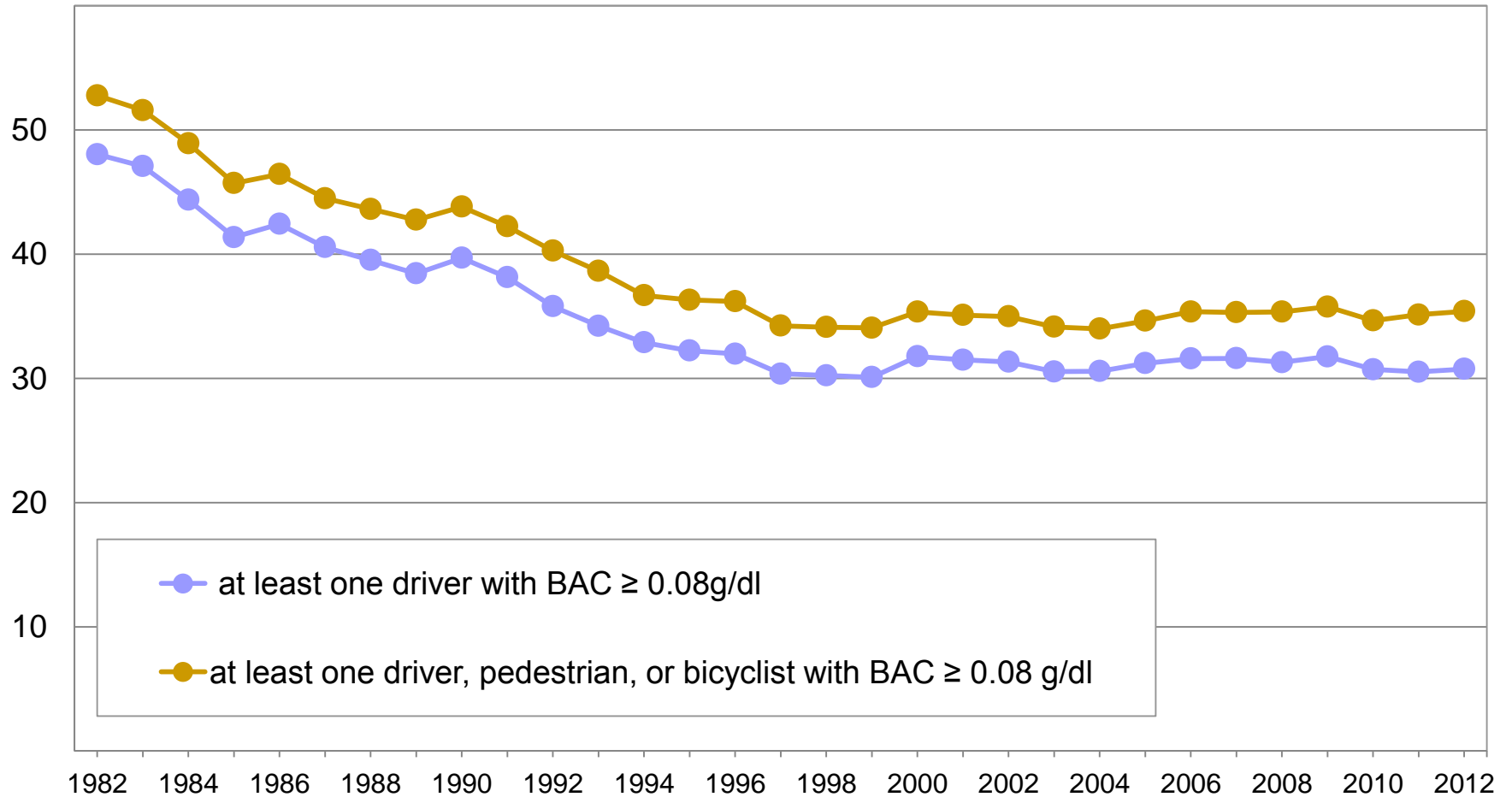
Drop in weekend drinking and driving doesn't bring drop in fatal crashes involving alcohol

ALSO IN  
THIS ISSUE  
Vol. 48, No. 10  
December 30, 2013

- ▶ Walking and biking under the influence carry dangers, too
- ▶ Vehicle design changes could reduce pedestrian crash deaths
- ▶ New Inside IIHS film offers look at crash test preparation

# Percent of crash deaths involving BACs $\geq 0.08$ g/dl

By calendar year, 1982-2012

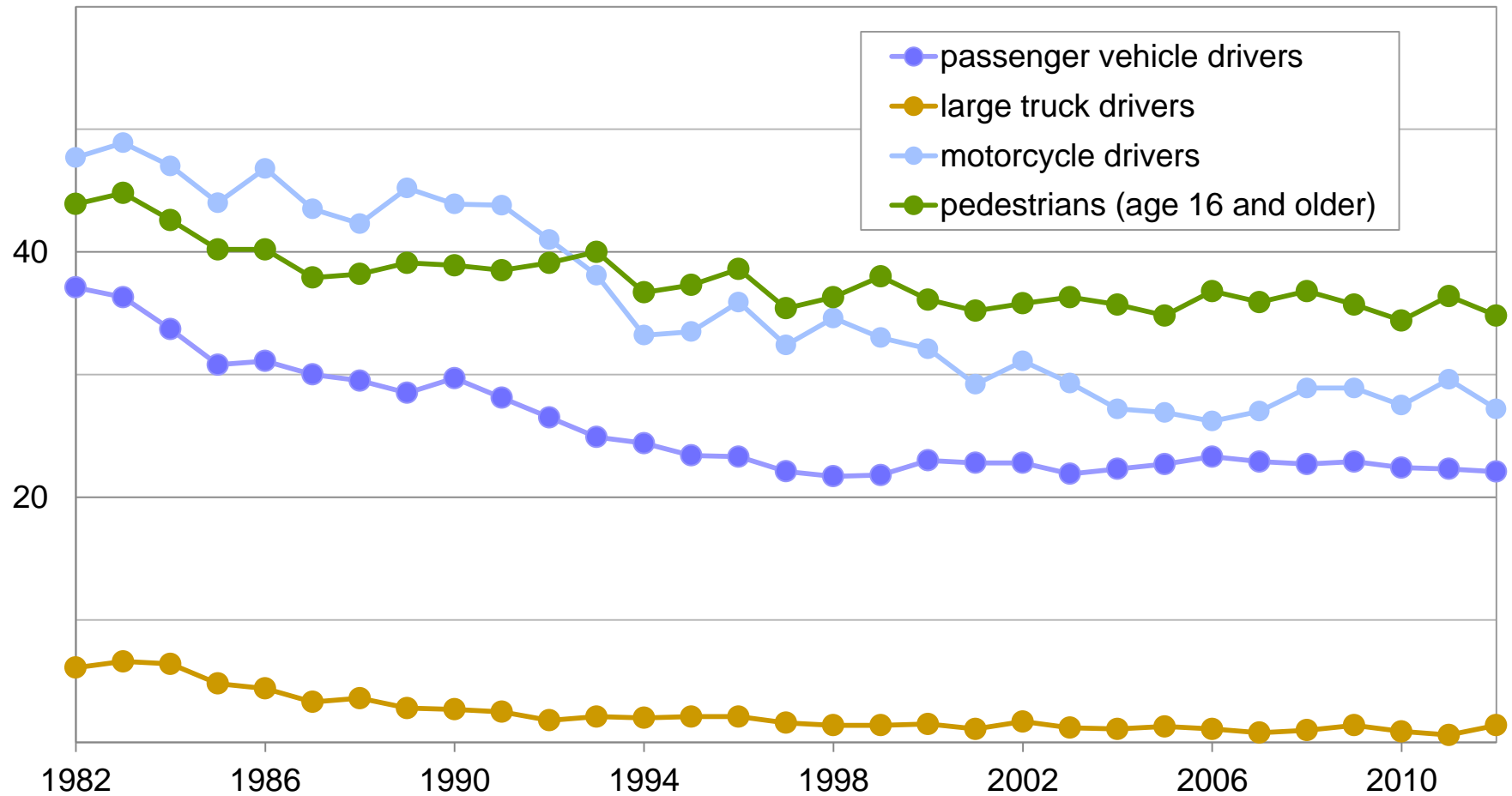




# Profile of alcohol-impaired drivers



# Percentage of drivers and pedestrians in fatal crashes with BACs $\geq 0.08$ g/dl, 1982-2012



# Percentage of drivers in fatal crashes with BACs $\geq$ 0.08 g/dl, 1996 and 2012

Gender, age, restraint use

	1996	2012
males	25	24
females	13	14
age 16-20	17	18
age 21-30	31	31
age 31-40	28	27
age 41-60	18	20
age 61+	7	8
restrained drivers	11	12
unrestrained drivers	37	40

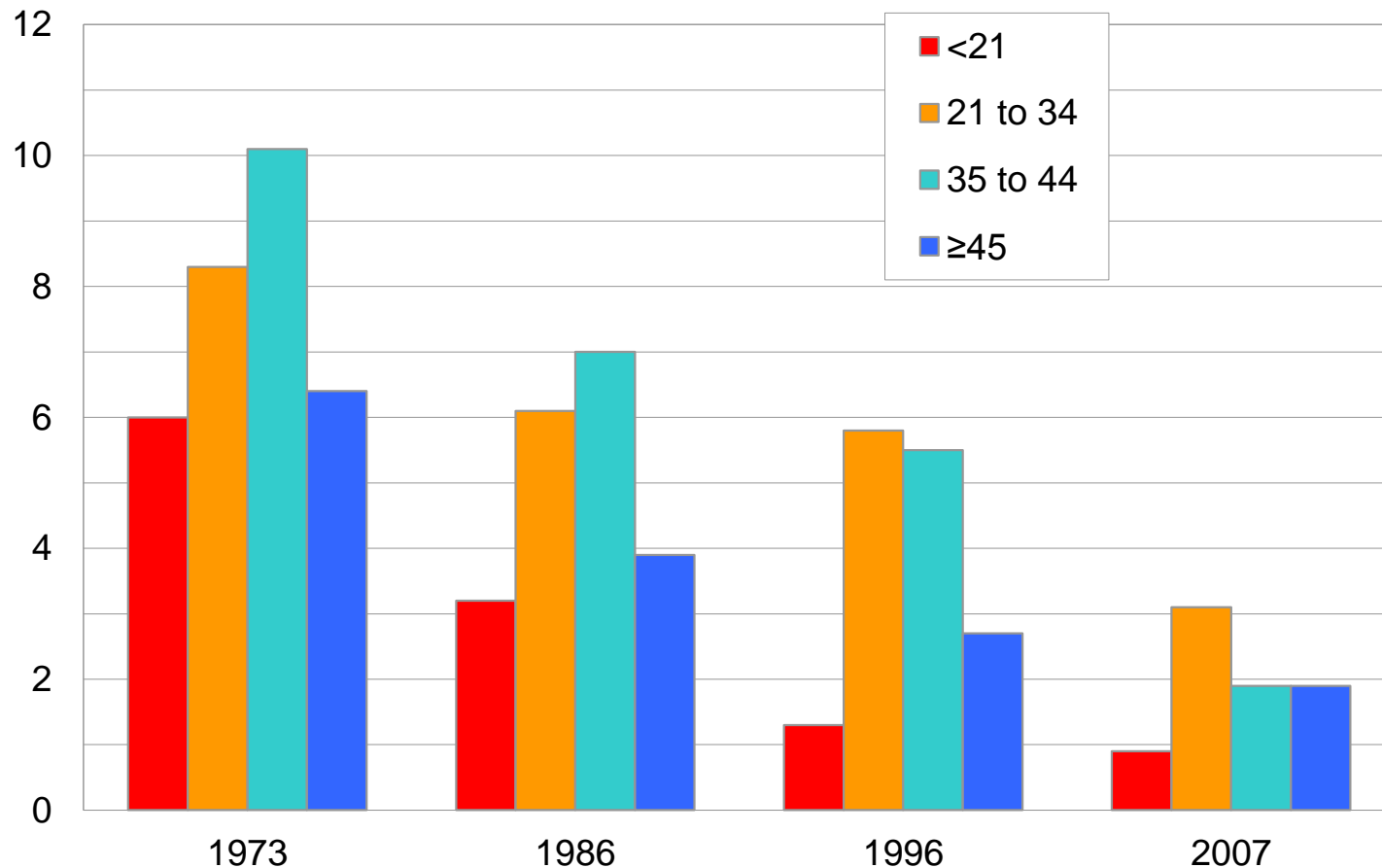
# Percentage of drivers in fatal crashes with BACs $\geq$ 0.08 g/dl, 1996 and 2012

Urban vs. rural, nighttime vs. daytime

	1996	2012
urban roadway	20	19
rural roadway	23	23
nighttime (9pm-6am)	44	41
other hours	12	12

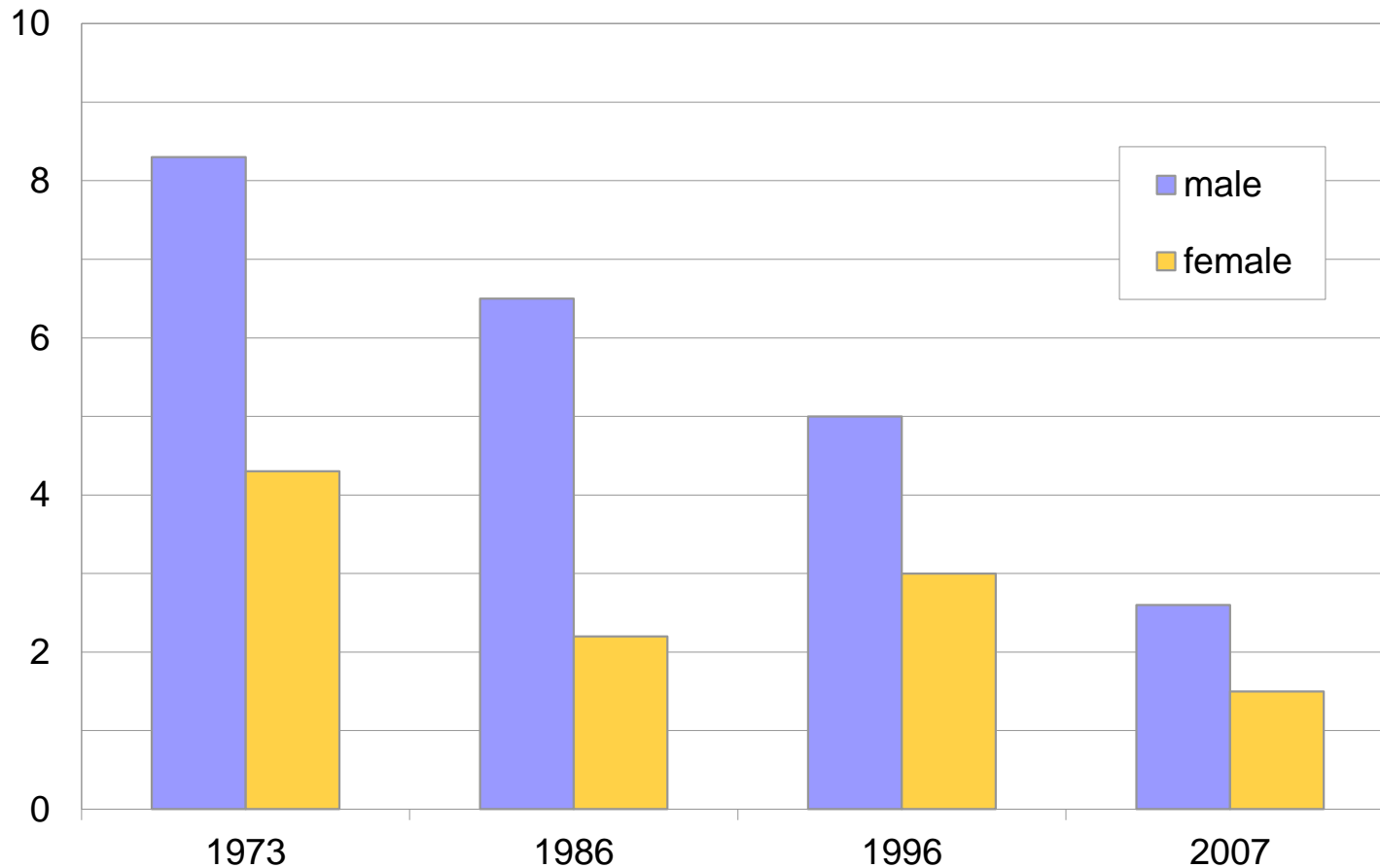
# Percent of weekend nighttime drivers with BACs $\geq$ 0.08 g/dl in national roadside surveys, by age

Voas et al., 1998; Lacey et al., 2009



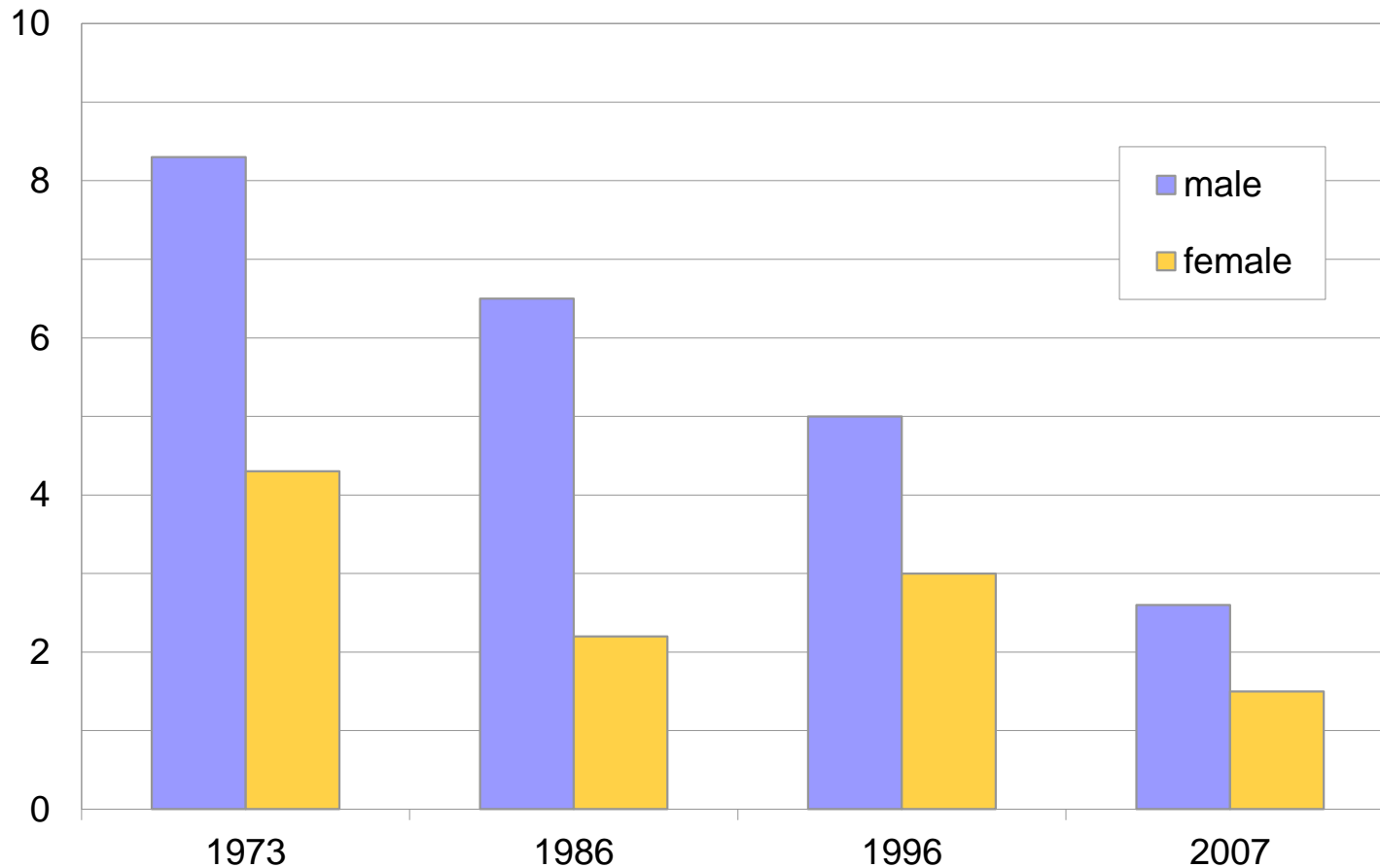
# Percent of weekend nighttime drivers with BACs $\geq$ 0.08 g/dl in national roadside surveys, by gender

Voas et al., 1998; Lacey et al., 2009



# Percent of weekend nighttime drivers with BACs $\geq$ 0.08 g/dl in national roadside surveys, by gender

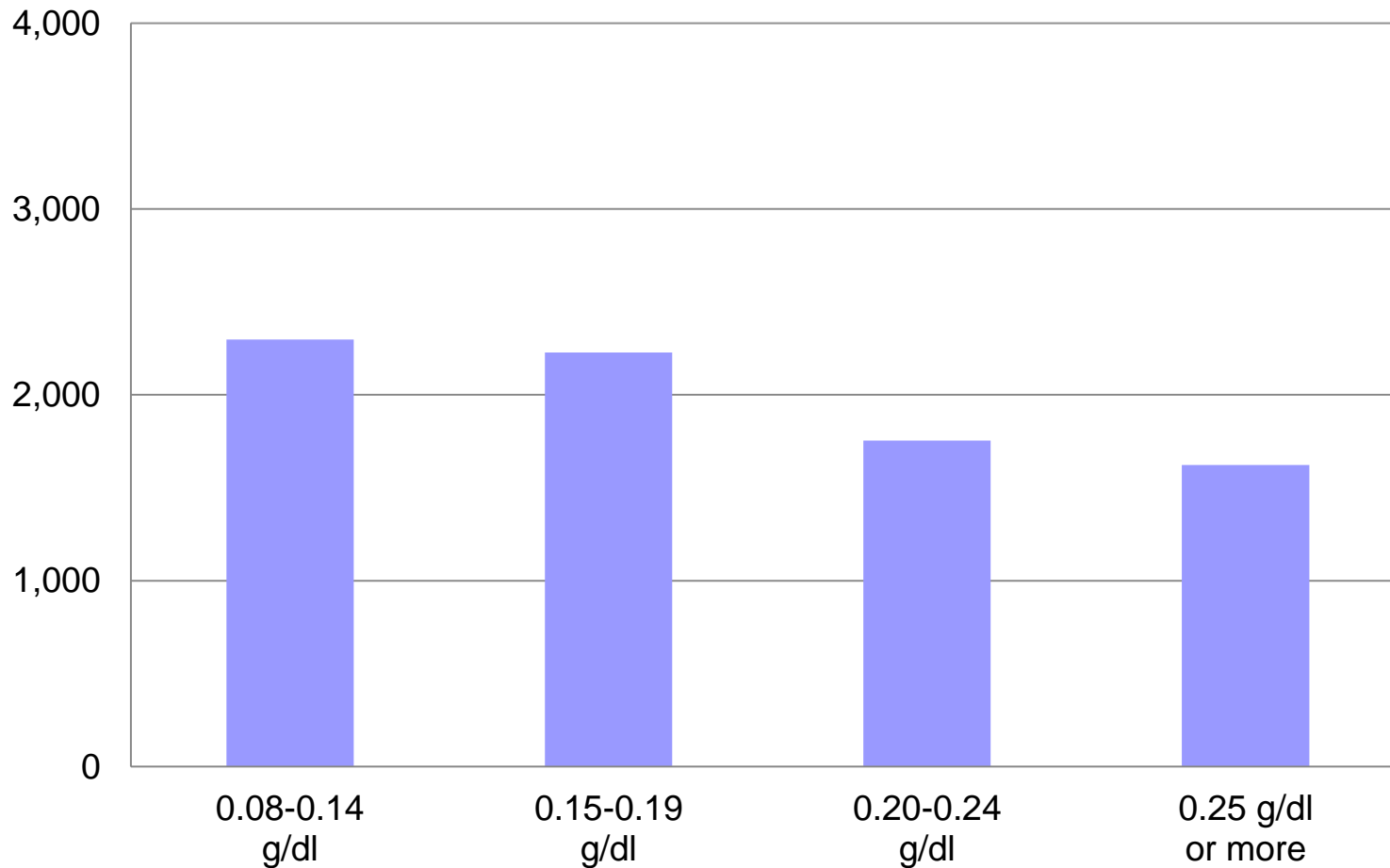
Voas et al., 1998; Lacey et al., 2009





Should we focus primarily on  
“hardcore” DUI offenders?

# Deaths in 2012 involving passenger vehicle drivers with various BACs

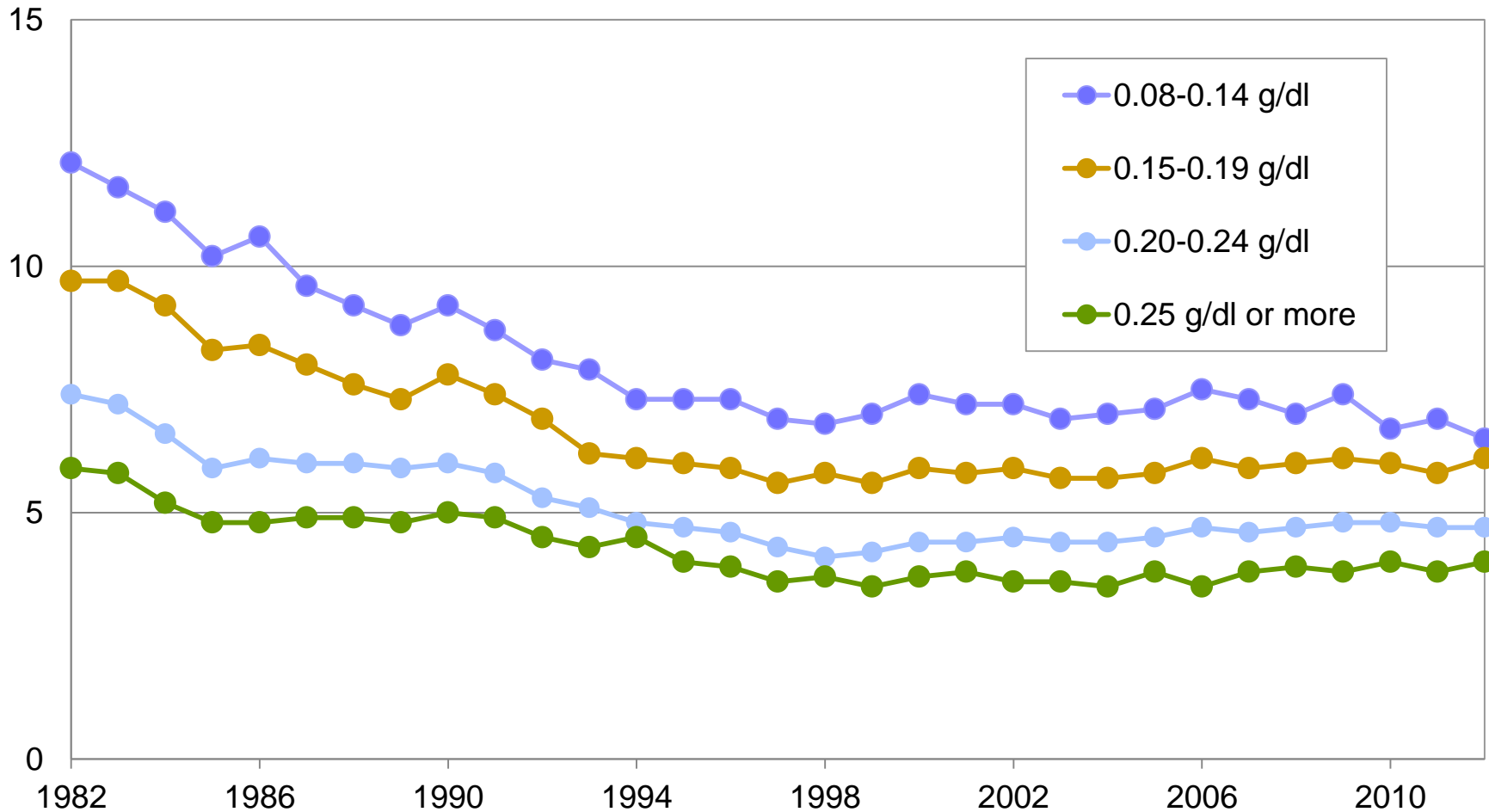


# Percentage of drivers in fatal crashes with DUI convictions within 3 years

2012

no prior offenses	95.5
1 prior offense	2.3
2 or more prior offenses	0.4
unknown	1.8

# Percentage of drivers in fatal crashes with various BACs, 1982-2012





What works to reduce alcohol-impaired driving?

# STATUS REPORT

INSURANCE INSTITUTE  
FOR HIGHWAY SAFETY

Vol. 46, No. 7, Aug. 18, 2011

## LOW-HANGING FRUIT

Oftentimes saving a life on the road is as basic as getting people to slow down, buckle up, or don a helmet. Tried and true countermeasures like these usually don't grab headlines, but if they were more widely propagated across the nation they would yield an immediate reduction in motor vehicle crash deaths.

The number of people who die in crashes in the United States is at a record low. Still, there were an estimated 32,788 motor vehicle crash deaths last year, according to a preliminary projection by the National Highway Traffic Safety Administration (NHTSA).

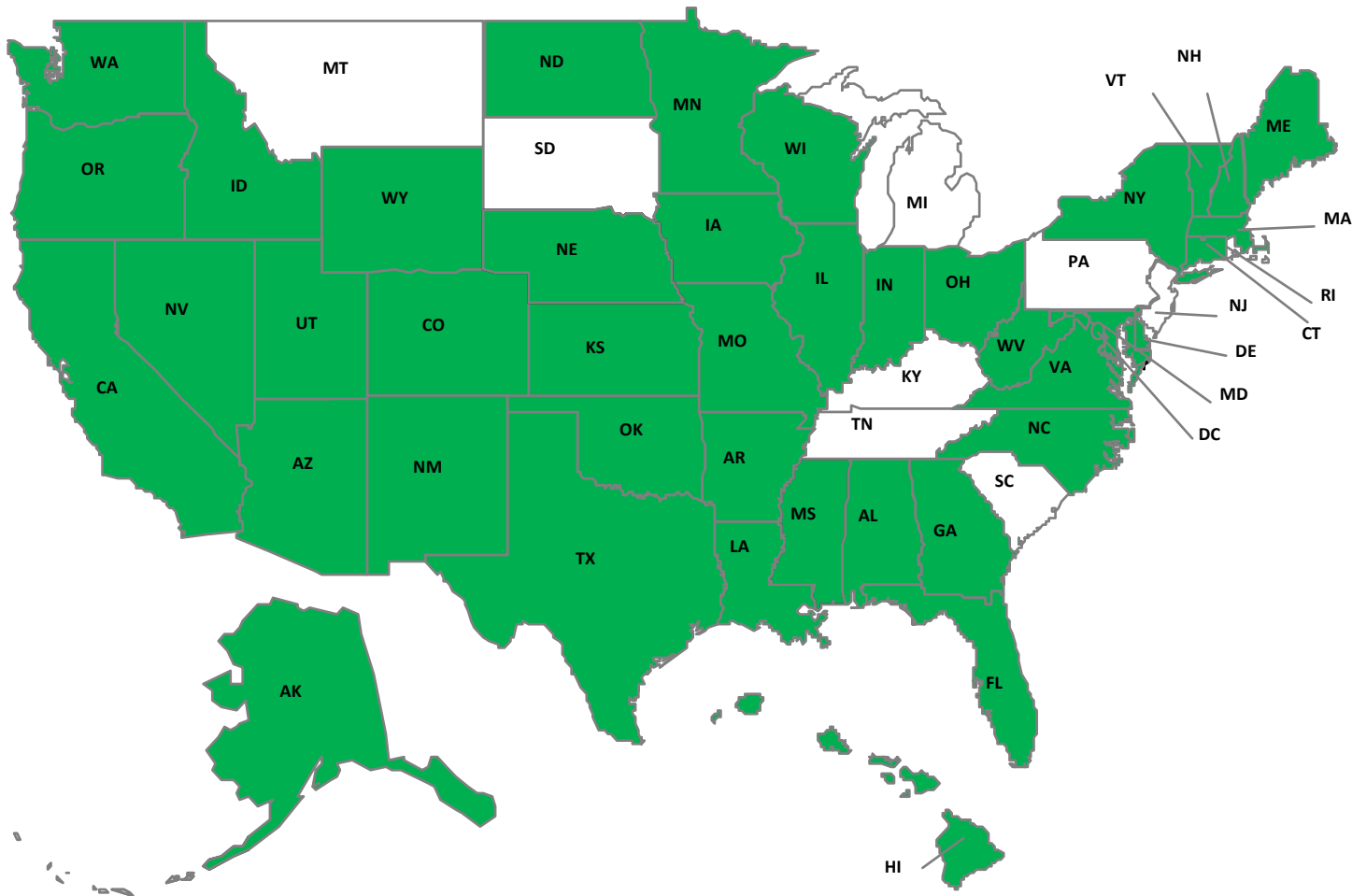
Vehicles are safer than ever, and emerging technologies

August 18, 2011



# Laws requiring administrative license suspension (ALS) for all first DUI offenses

June 2014



# Administrative license suspension (ALS) laws

- ALS laws remove impaired drivers from the road quickly and ensure that penalties are applied
- Effectiveness of ALS laws
  - reduce alcohol-impaired driving among the general population
  - reduce recidivism among DUI offenders
  - reduce the number of fatal crashes likely to involve alcohol and the number of drivers with positive BACs involved in fatal crashes (Zador et al., 1989; Klein, 1989; Wagenaar and Maldonado-Molina, 2007)

# Sobriety checkpoints are effective, but many U.S. communities do not conduct them on a regular basis

- Median reduction of 20 percent in alcohol-related crashes associated with publicized sobriety checkpoints (Elder et al., 2002)
- 10 states prohibit sobriety checkpoints by state constitution or law
- Some enforcement agencies believe a large number of officers are required, but small-scale checkpoints can be conducted successfully and safely

# Traditional large-scale sobriety checkpoint





Low manpower checkpoint program in West Virginia  
reduced percent of drivers with BACs  $\geq 0.05$  g/dl  
(Lacey et al., 2006)



# College community campaign to reduce drinking and driving with strong enforcement emphasis in West Virginia (McCartt et al., 2009)

*Drink and drive*

**GET  
BUSTED**

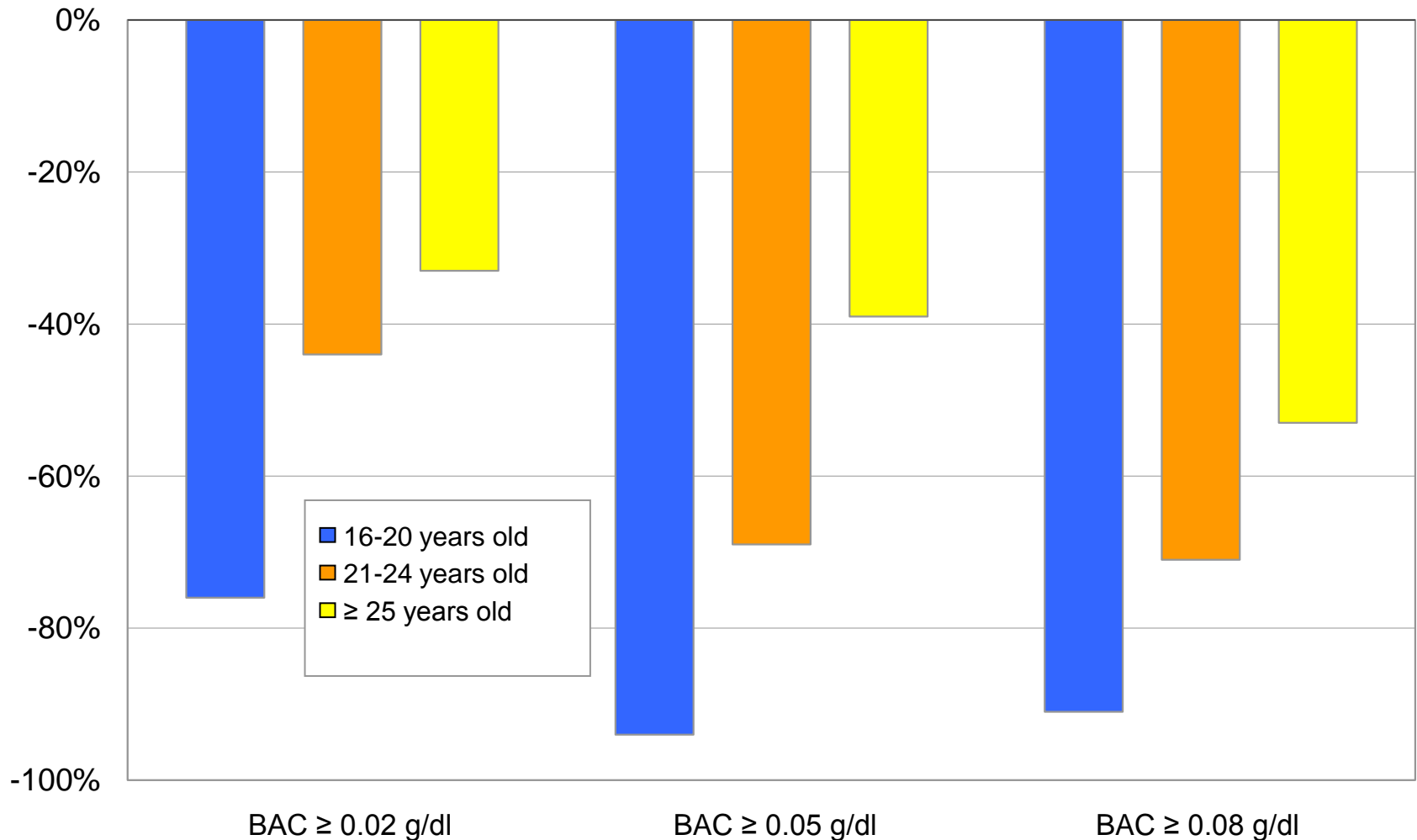


*Drink before you're legal*

**GET  
BUSTED**



# Percent reduction in odds of given BAC in program community, by age group





# Alcohol ignition interlocks



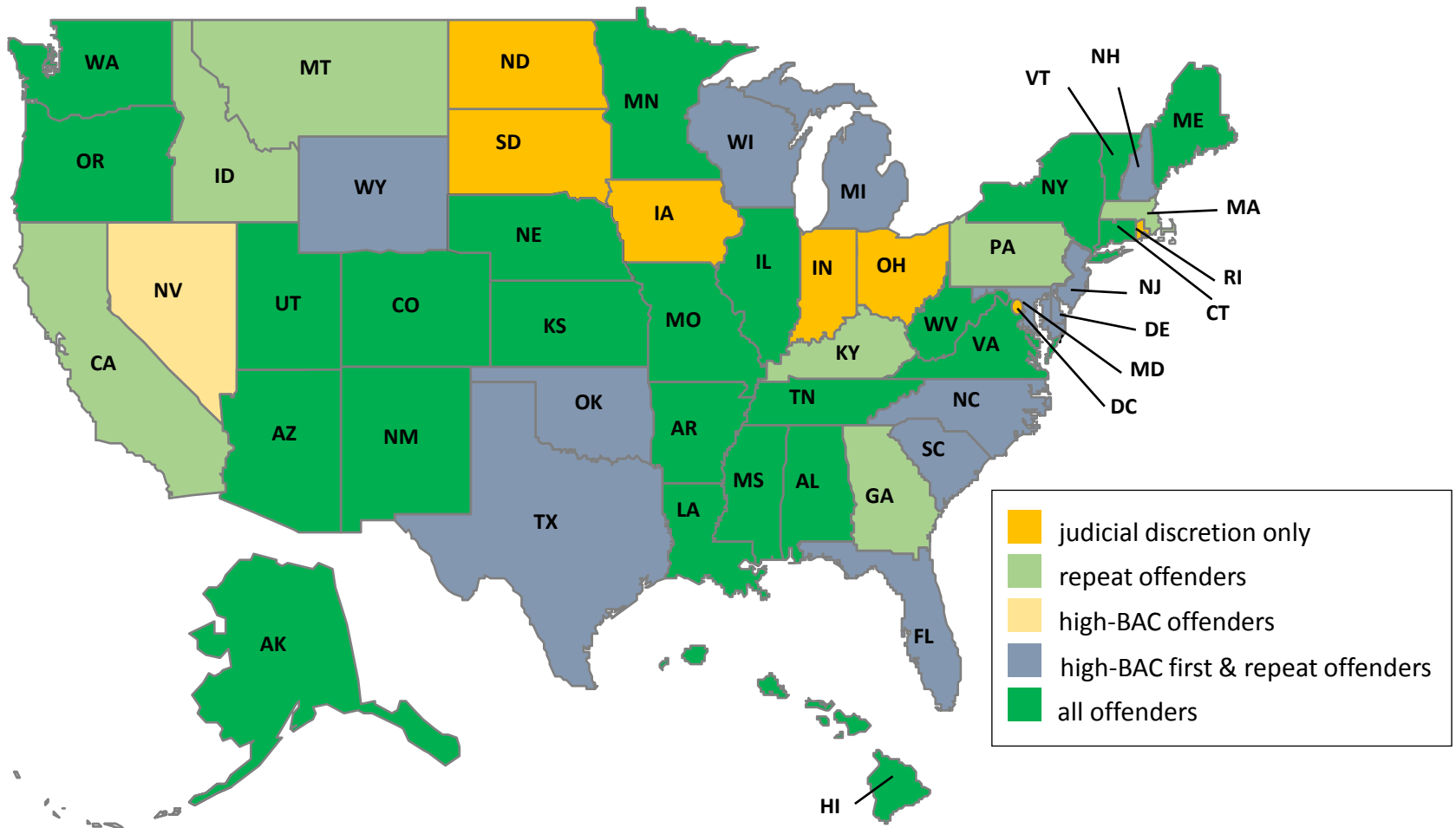
# Alcohol ignition interlocks

- Driver blows into a tube to test breath for alcohol
- Vehicle won't start if certain amount of alcohol detected
- Periodic retests while vehicle is in motion
- $BAC \leq 0.025$  g/dl is typical threshold for DUI offenders



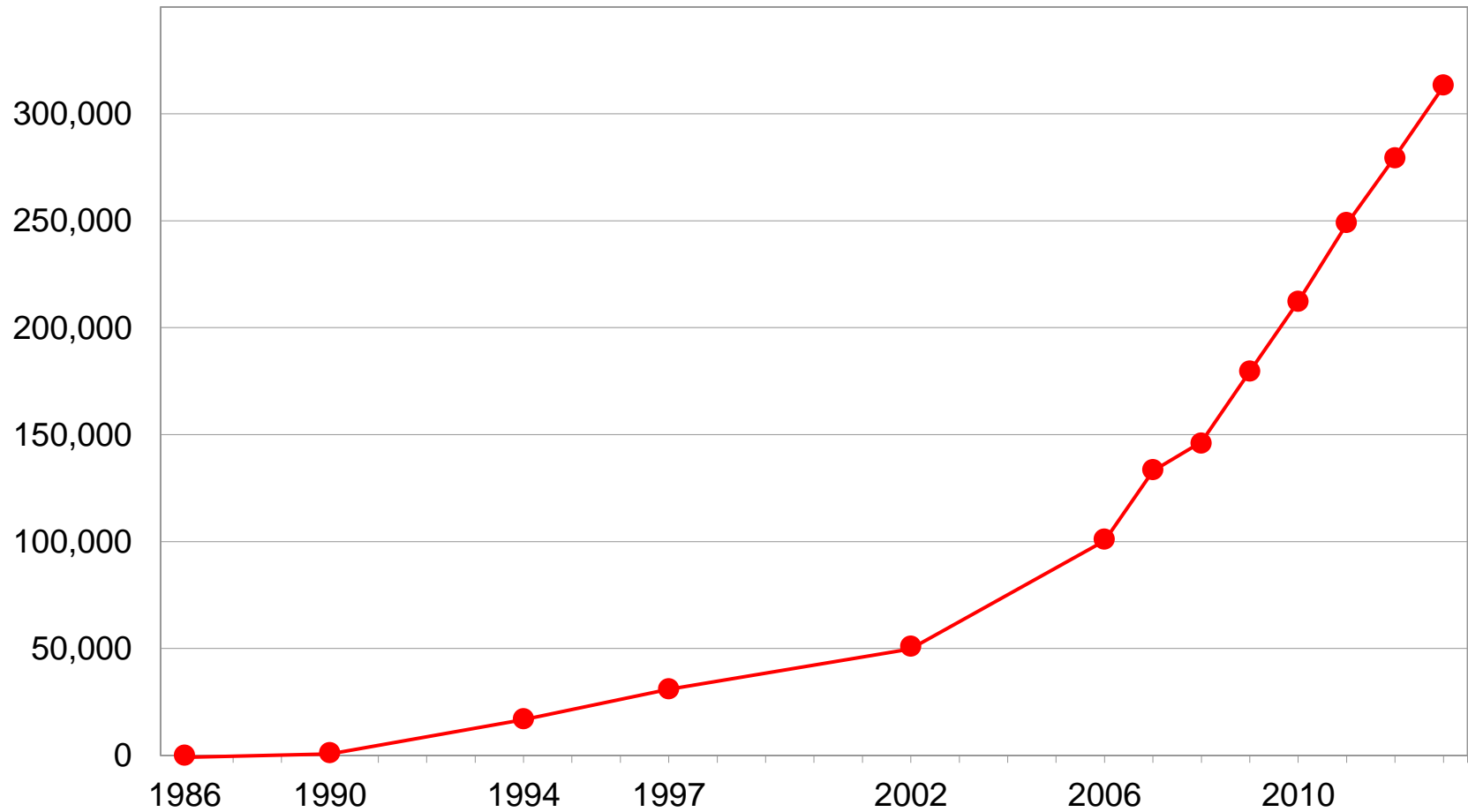
# Laws mandating alcohol ignition interlock orders

June 2014



# Installed interlocks in United States

1986-2013

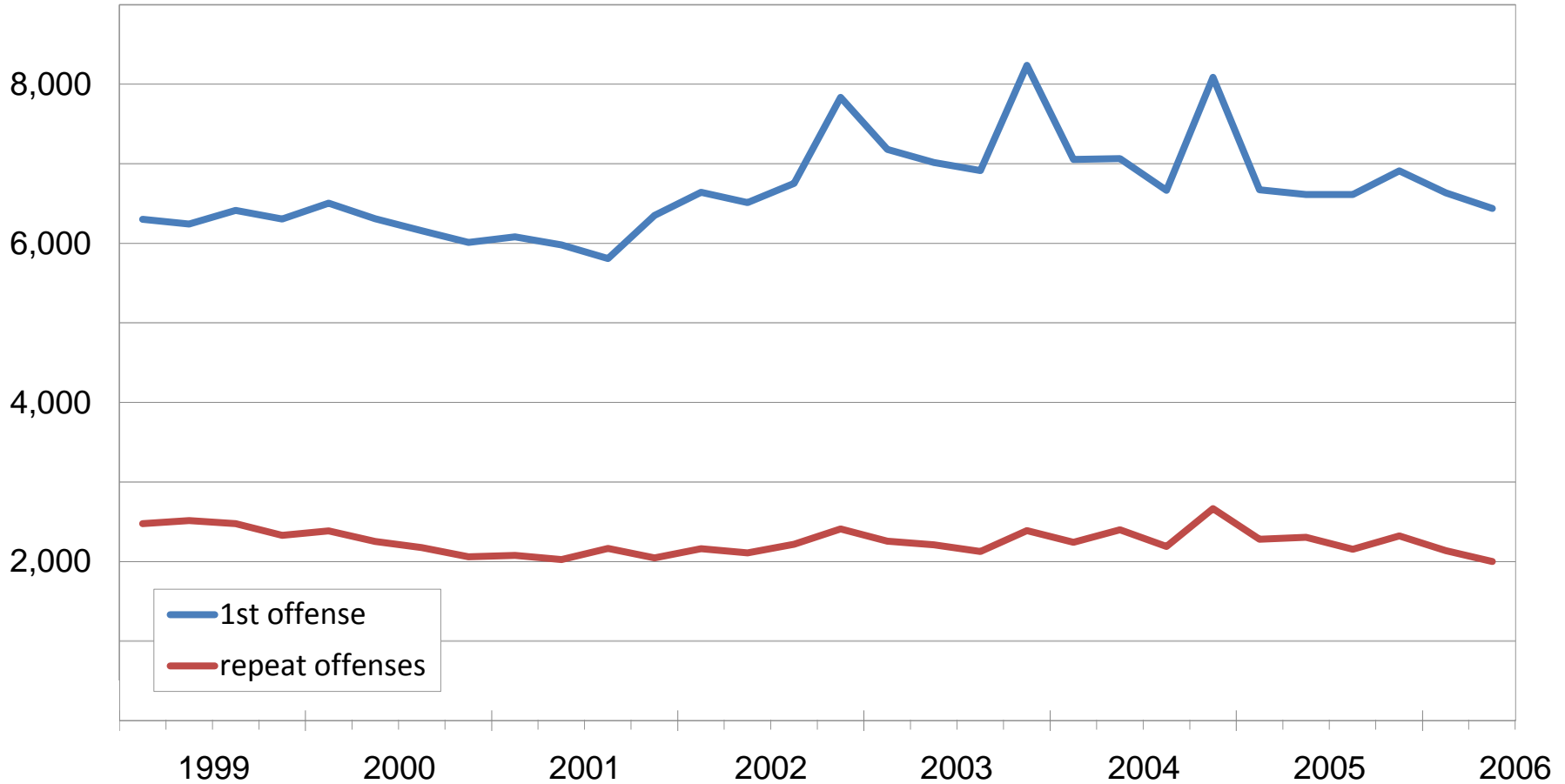


# Prior studies of effects of interlocks on recidivism

- Most studies compared recidivism rates of offenders who installed interlocks vs. those who did not
  - Reductions in recidivism of 60-80 percent while interlocks installed
  - Reductions found for both repeat and first offenders
  - Effects dissipate after interlocks removed
  - Difficult to adequately account for potential differences between offenders who elected to get interlocks and those who did not
- IHS study of Washington state interlock laws examined the effects of an all-offender law requiring interlock orders on recidivism among all offenders affected by the law (McCartt et al., 2013)

# Counts of DUI convictions in Washington

By quarter of arrest, January 1999-June 2006

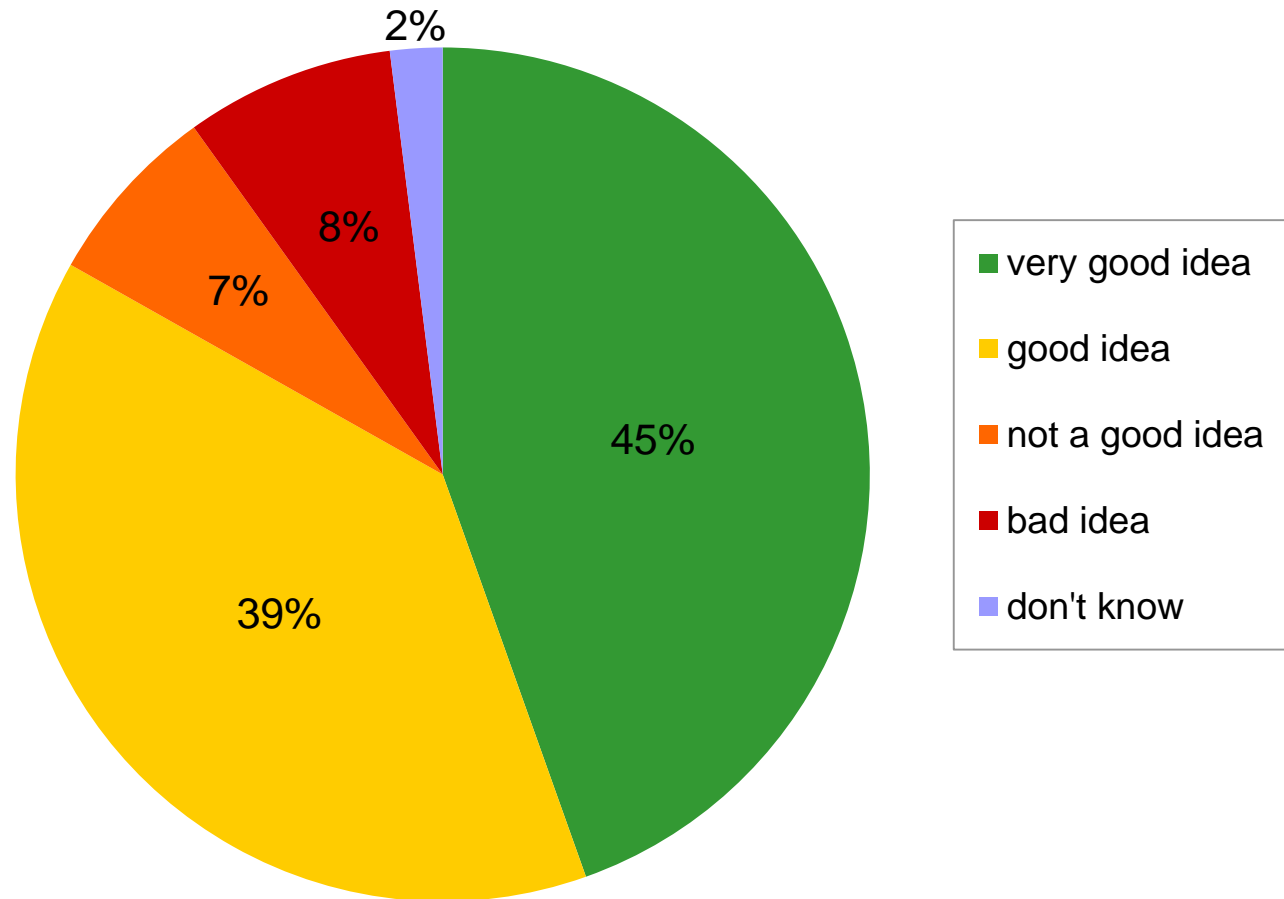


# Effects of extending interlock requirement to all first-time DUI convictions in Washington state

- Recidivism among affected offenders reduced by 12 percent, even with low interlock installation rate (about one-third)
- Additional gains achievable with higher installation rates
  - predicted recidivism about half at 100 percent vs. 34 percent installation rate
- Law change associated with significant 8.3 percent reduction in risk of single-vehicle nighttime crashes, suggesting a general deterrent, population effect
- Implications for states?
  - Extend interlock requirements to all DUI convictions
  - Publicize interlock laws to deter all drivers from driving impaired

# Attitudes toward requiring alcohol ignition interlocks for convicted DWI offenders

National telephone survey, 2009





# Advanced in-vehicle alcohol detection technology



# STATUS REPORT

INSURANCE INSTITUTE  
FOR HIGHWAY SAFETY

Vol. 44, No. 8, Sept. 17, 2009



## **PUBLIC IS READY TO LOCK OUT DRIVING OVER THE LEGAL LIMIT**

even though the technology to do it isn't available yet. People surveyed across the nation said they like the idea of using advanced technology to prevent any driver from starting a vehicle after drinking too much alcohol. About 2 of 3 respondents deem this a good or very good idea, assuming the technology is reliable. More than 40 percent would want such devices in their own cars if they were offered as an option. Drinkers and nondrinkers alike favor the concept.

These are the main findings of a new survey, the Institute's first take on what people think about equipping all vehicles with alcohol detection devices that would be more sophisticated than the ignition interlocks in some vehicles today. A total of 1,004 people were surveyed July 15-19, and results were weighted for the US population.

"The results are clear-cut and a bit surprising," says Anne McCartt, Institute senior vice president for research. "We didn't expect to find support across the

September 17, 2009

# Potential lives saved in 2012 if all drivers with specific BACs were kept off the roads

	BAC ≥ 0.08 g/dl	positive BAC
drivers with multiple DUI convictions within 3 years	84	119
drivers with at least one prior DUI conviction within 3 years	484	689
all drivers	7,132	10,680

# Broader installation of alcohol detection technology

- Current ignition interlocks are not suitable for use in all vehicles
  - Inconvenient, expensive, require calibration
  - People who obey alcohol-impaired driving laws
  - People who don't drink alcohol
- Need technology that is virtually invisible to driver without sacrificing precision
  - Accurately detects BAC  $\geq 0.08$  g/dl without false positives or false negatives)
  - Must differentiate between driver and passenger

# Driver alcohol detection system for safety

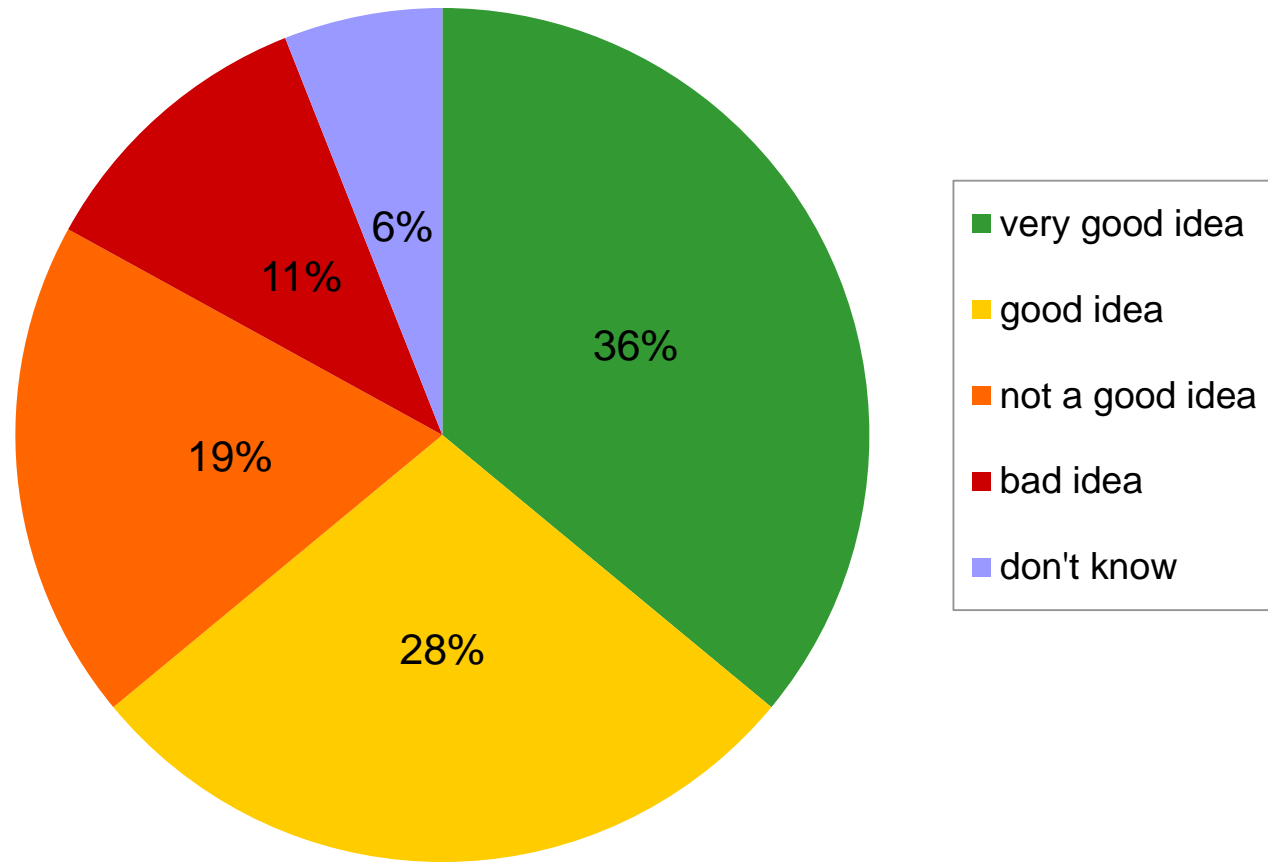
- Partnership between federal government and automakers
  - Research, develop, test advanced alcohol detection technology suitable for all vehicles
  - Build public support for vehicle-based approach
- Two technology firms developing systems (one breath-based, one touch-based) that reliably determine driver's BAC in 1/3 second and are reliable and durable enough to install in vehicle
- Phase three – 5 years beginning fall 2013
  - Refine devices, test with human subjects, demonstrate commercial feasibility
  - Gauging public response to specific technologies



**dadss**  
**Driver Alcohol Detection  
System for Safety**

# Attitudes toward advanced alcohol test technology in all vehicles, if technology shown to be reliable

IIHS national telephone survey, 2009





# Crash avoidance is the new frontier

# Google autonomous car

## Autonomous Driving

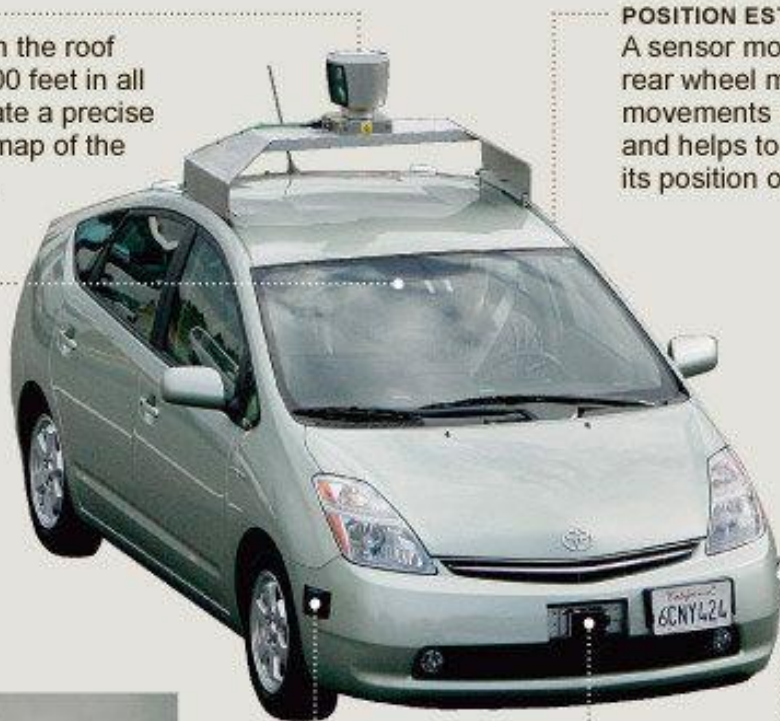
Google's modified Toyota Prius uses an array of sensors to navigate public roads without a human driver. Other components, not shown, include a GPS receiver and an inertial motion sensor.

### LIDAR

A rotating sensor on the roof scans more than 200 feet in all directions to generate a precise three-dimensional map of the car's surroundings.

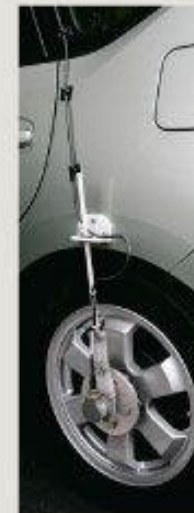
### VIDEO CAMERA

A camera mounted near the rear-view mirror detects traffic lights and helps the car's onboard computers recognize moving obstacles like pedestrians and bicyclists.



### POSITION ESTIMATOR

A sensor mounted on the left rear wheel measures small movements made by the car and helps to accurately locate its position on the map.



### RADAR

Four standard automotive radar sensors, three in front and one in the rear, help determine the positions of distant objects.

Source: Google

THE NEW YORK TIMES; PHOTOGRAPHS BY RAMIN RAHIMIAN FOR THE NEW YORK TIMES



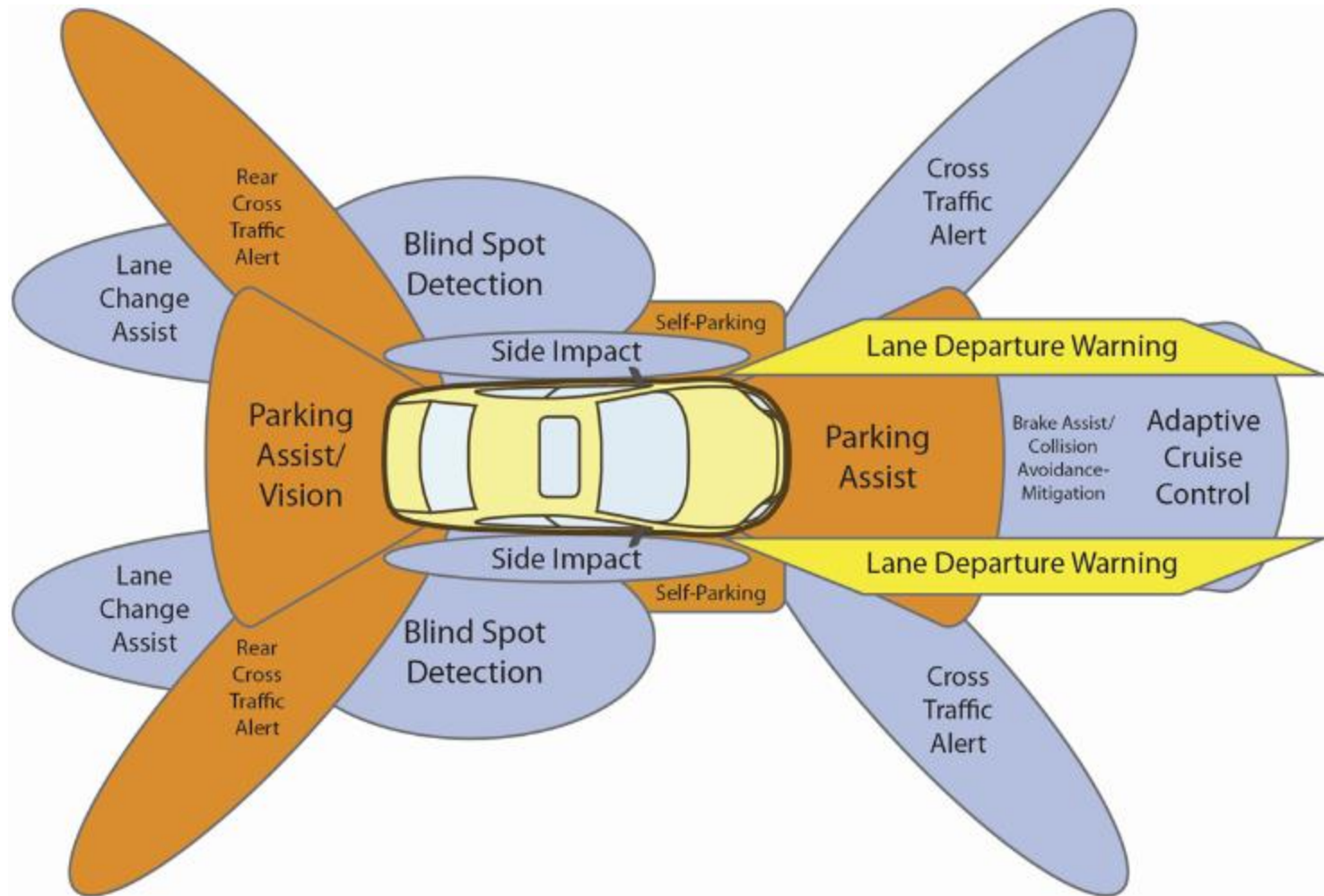
# Google self-driving cars





# Driver assistance features

Radar, LIDAR, ultrasonic, infrared, cameras, GPS



# Annual crashes potentially prevented or mitigated

Based on 2004-08 crash totals

	all	injury	fatal
forward collision warning	1,165,000	66,000	879
lane departure warning	179,000	37,000	7,529
side view assist	395,000	20,000	393
adaptive headlights	142,000	29,000	2,484
total unique crashes	1,866,000	149,000	10,238
percent of crashes	32%	21%	31%




## **AVOID CRASHES.**

That's the purpose of a crop of technologies showing up in mostly luxury cars and SUVs. A new analysis from the Highway Loss Data Institute (HLDI) indicates that Volvo XC60 midsize SUVs outfitted with standard City Safety get into fewer crashes than comparable vehicles without the feature. The forward collision avoidance system is designed to help a driver avoid rear-ending another vehicle in slow-moving, heavy traffic.



- Forward collision prevention systems are reducing insurance collision claims
- Adaptive headlights are working
- The benefits of these systems are less clear
  - Lane departure warning
  - Blind spot warning
  - Rearview cameras
  - Parking proximity sensors



Television coverage:  
Front crash prevention

**NEWS  
ROOM**

**DO AUTOMATIC BRAKES REALLY WORK?**  
Rating new technologies in cars

**LIVE  
CNN**

ARGET THE FRIES AND FIGHT THE FAT ▶ CLINTON, ONCE KNOWN FO 9:07 AM ET

# Summary

- We are entering an exciting period in advanced automotive technology
- Reaping the rewards of this technology will be a gradual, slow process; unclear how it will affect alcohol-impaired driving crashes
- In the near term – over the next ten years and likely beyond – our success in reducing crash deaths and injuries will also depend on other proven countermeasures in highway safety
- This includes strong DUI laws strongly enforced and meaningful penalties, including alcohol ignition interlocks





## MORE CARS THAT BRAKE BY THEMSELVES

New **front crash prevention ratings** include more vehicles with advanced or superior systems with autobrake.



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The **Highway Loss Data Institute (HLDI)** shares and supports this mission through scientific studies of insurance data representing the human and economic losses resulting from the ownership and operation of different types of vehicles and by publishing insurance loss results by vehicle make and model.

Both organizations are wholly supported by [these auto insurers and insurance associations](#).



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## Alcohol-impaired driving

People continue to drive impaired, but good enforcement can deter them.

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### Overview

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### Public presentations

### Regulatory and legislative policy

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Progress on impaired driving has stalled since the mid-1990s. Despite earlier declines in alcohol-related highway deaths, about a third of all drivers who die in crashes in the U.S. have blood alcohol concentrations of 0.08 percent or higher. More than 7,000 deaths could have been prevented in 2012 if all drivers were below the legal limit.

**The key to reducing alcohol-impaired driving is deterrence.** People are less likely to drink and drive if they believe they'll get caught. Sustained and well-publicized enforcement is the best way to let potential violators know they won't get away with it.

Effective measures against impaired driving include:

- ▶ **administrative license suspension.** This procedure, allowed in most states, lets police immediately take away the license of someone who either fails or refuses to be tested for alcohol even before they are convicted.
- ▶ **sobriety checkpoints.** Checkpoints, which have been upheld by the U.S. Supreme Court, don't always result in a lot of arrests, but they are a good deterrent if they are visible and publicized. Not all states have them.
- ▶ **minimum drinking age of 21.** Young drivers have a much higher crash risk after drinking alcohol than adults. Setting 21 as the minimum legal age for purchasing alcohol has helped reduce alcohol-impaired driving among teenagers. However, better enforcement of these laws is needed in many places.
- ▶ **alcohol interlocks.** Many states require these devices for people with impaired driving convictions. People are less likely to reoffend when they're required to have an interlock.



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Dedicated to reducing deaths, injuries,  
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