



INSURANCE INSTITUTE
FOR HIGHWAY SAFETY

HIGHWAY LOSS
DATA INSTITUTE

www.iihs.org

Hedging Your Bets: Risk Taking, Human Behavior, and Road Safety

PCI Joint Marketing and Underwriting Seminar
Las Vegas, NV • April 5, 2011

Adrian Lund, Ph.D.

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.

Where are we?

Location of IIHS/HLDI and Vehicle Research Center



Television coverage:
2011 TOP SAFETY PICKS

Television coverage:
Red light cameras

Television coverage:

Underride



Hedging your bets – Against what?

Motor vehicle crashes

2009

- 5,498,000 police-reported crashes
- 2,242,000 injured
- 33,808 killed

Additional crashes are not reported to police but result in insurance costs

Insurance losses from motor vehicle crashes

15 million crashes resulting in 22 million claims in 2009

- \$50 billion in property damage claim losses
 - \$30 billion in 1st party damage (collision coverage)
 - \$20 billion in 3rd party damage (property damage liability)
- \$35 billion in injury claim losses
 - \$11 billion in 1st party injuries
 - \$7 billion in PIP coverage
 - \$4 billion in MedPay coverage
 - \$24 billion in 3rd party injuries (BI coverage)



Love of speed

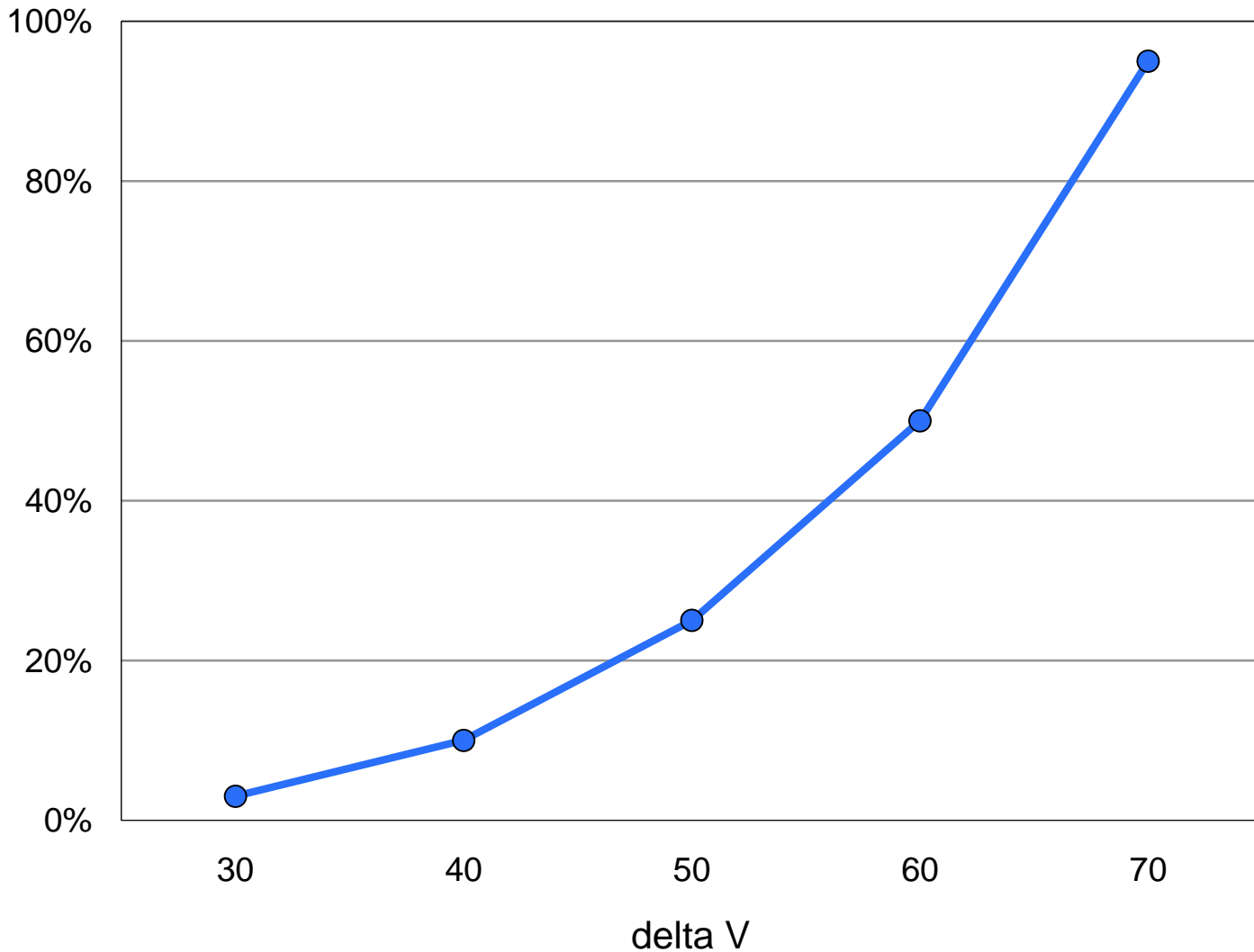
In 2009, more than 10,500 people died in speeding-related crashes

Speeding is a factor in about one-third of fatal crashes. The economic cost of speed-related crashes is estimated to exceed \$40 billion each year.



Driver fatality risk in relation to delta V

Probability of death, Joksch (1993)

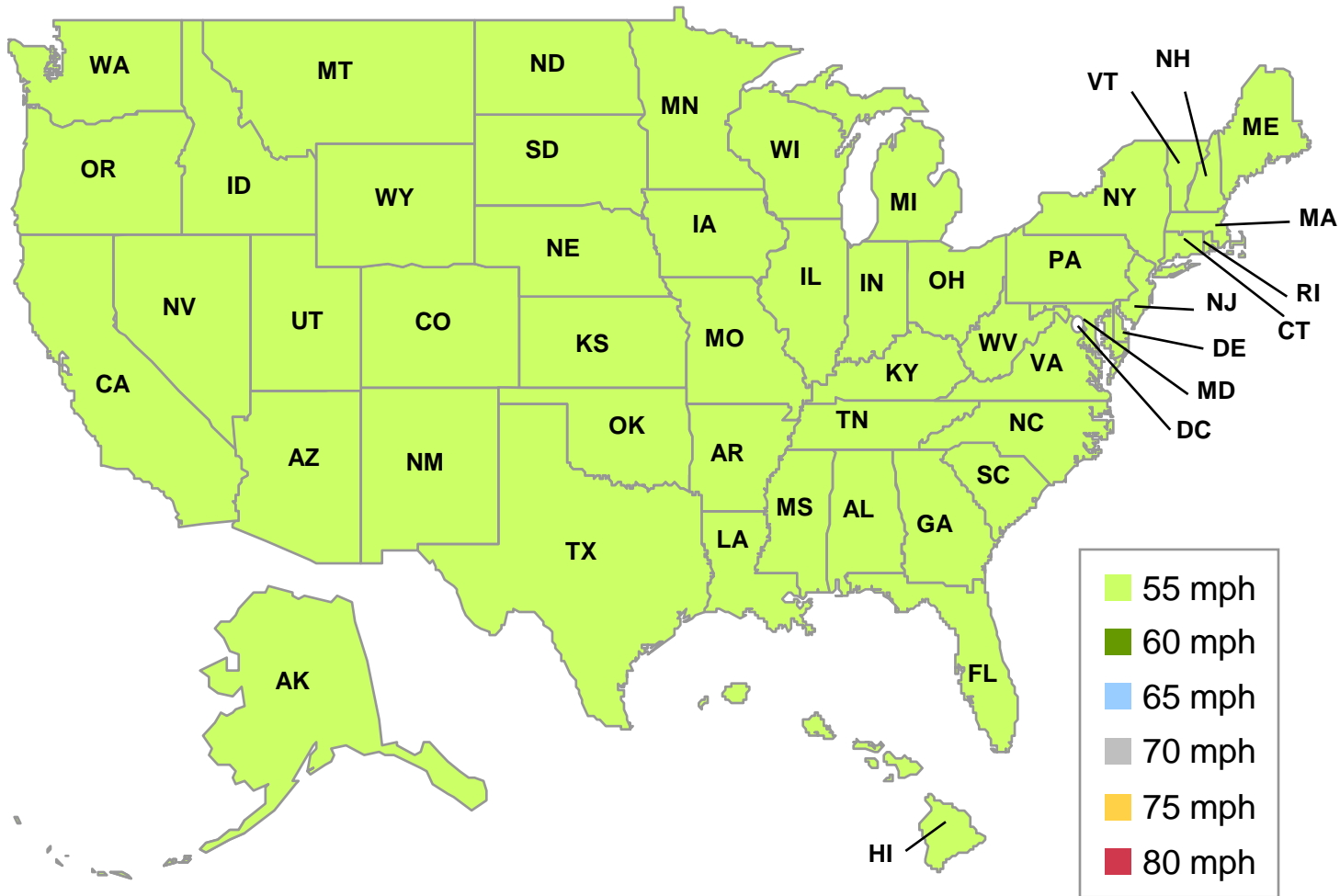


Effects of 1974 National Maximum Speed Limit (NMSL) legislation

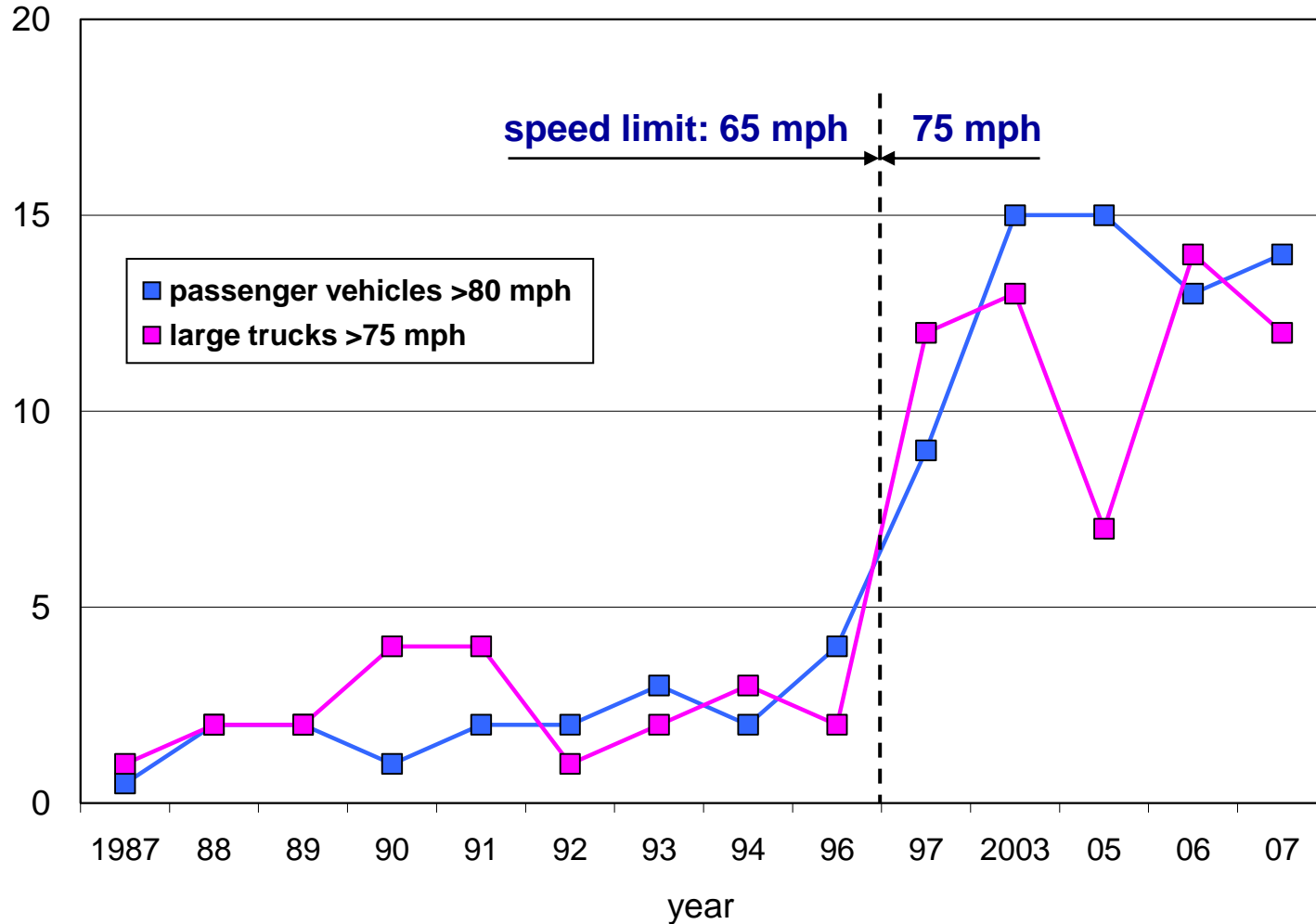
- NMSL of 55 mph established to conserve fuel
- Fatalities declined 16 percent, from 54,052 in 1973 to 45,196 in 1974
- Estimated 20,000 to 30,000 lives were saved by NMSL during 1974-1978 (NHTSA-FHWA, 1980)
- Travel speeds were reduced but compliance gradually eroded (TRB, 1984)

Maximum authorized speed limit: 55 mph

September 1986



Percent of vehicles exceeding high speeds on New Mexico rural interstates



Effects of raising speed limits

- 1973: 55 mph national maximum speed limit established as a fuel conservation measure
- 1987: Partial repeal; states allowed to increase speed limits to 65 mph on rural interstate highways
 - 40 states raised maximum speed limits during 1987-88
 - 19% increase in fatalities compared to other states
- 1995: Full repeal
 - 25 states raised maximum speed limits during 1995-96
 - 15% increase in fatalities compared to other states



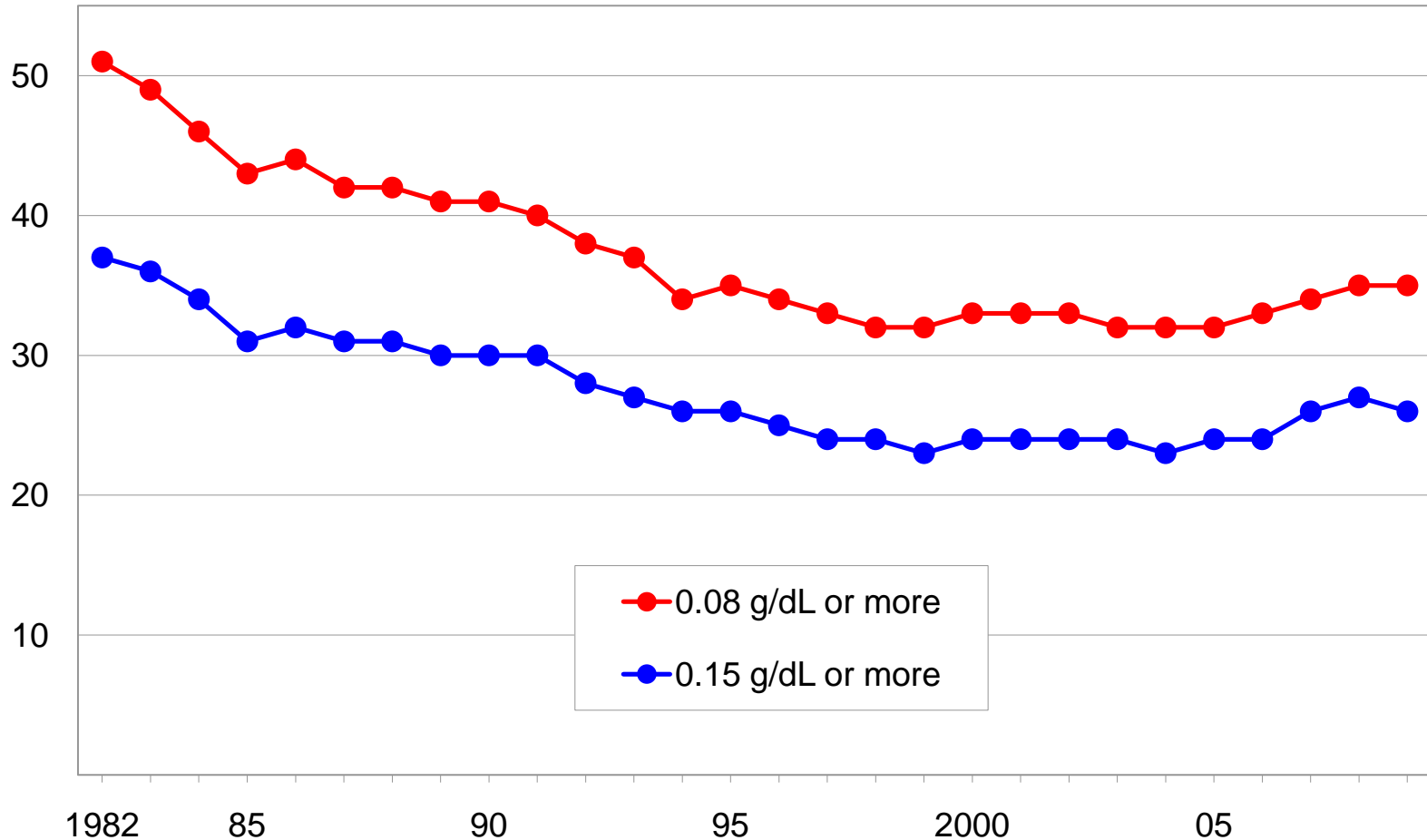
Alcohol-impaired driving

Potential lives saved in 2009 if driver BACs reduced to various maximums

maximum BAC permitted	lives saved
zero	11,323
0.05 g/dL	9,294
0.08 g/dL	7,440

Percent of fatally injured passenger vehicle drivers with BACs at or above specified levels

1982-2009



Traditional sobriety checkpoints



Potential lives saved in 2009 if BACs of drivers with prior DWI convictions within 3 years had been limited to specified maximums

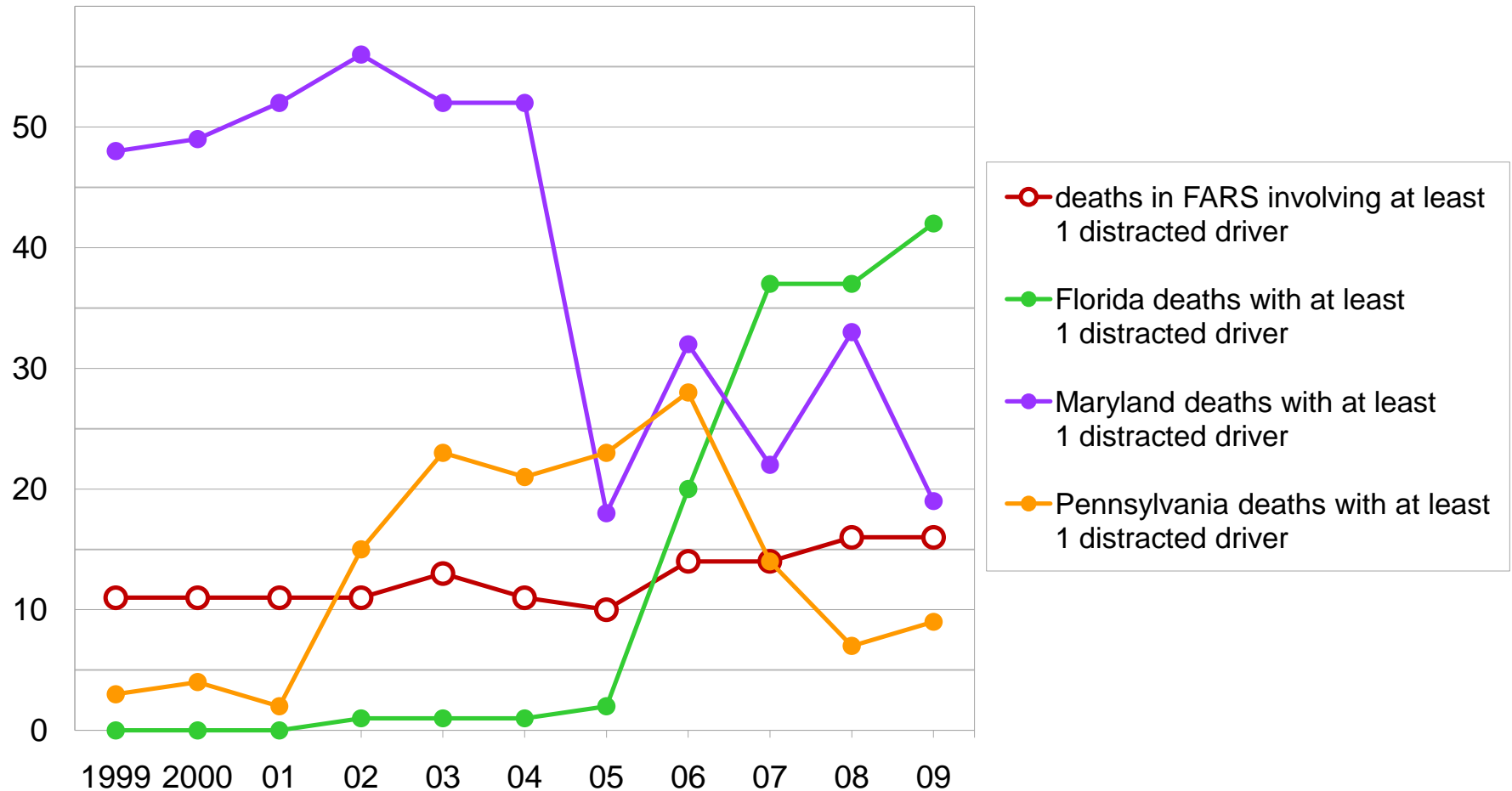
maximum BAC permitted	lives saved
zero	807
0.05 g/dL	689
0.08 g/dL	567



Distracted driving

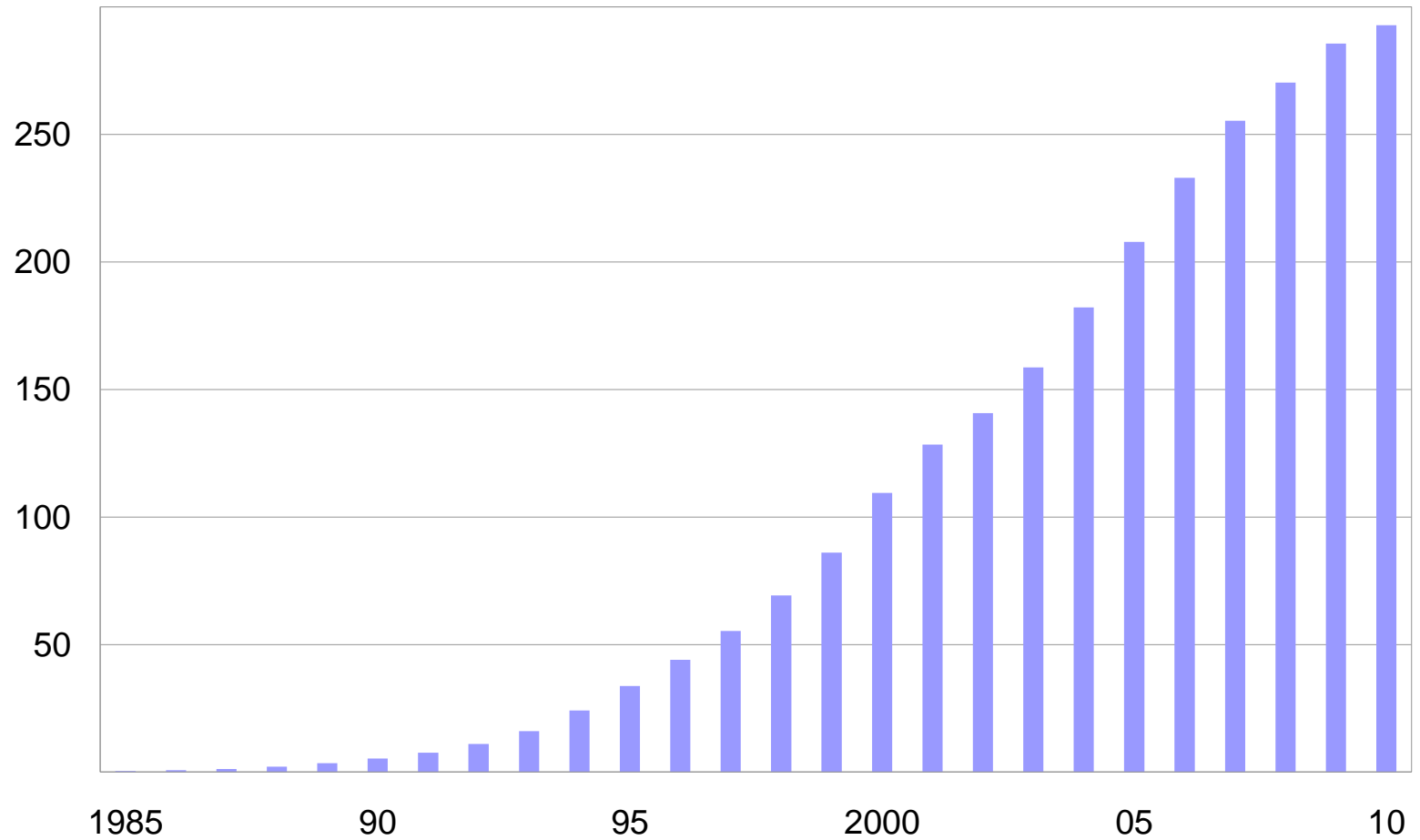
Changes in distracted driving coded in FARS

Percent, by calendar year



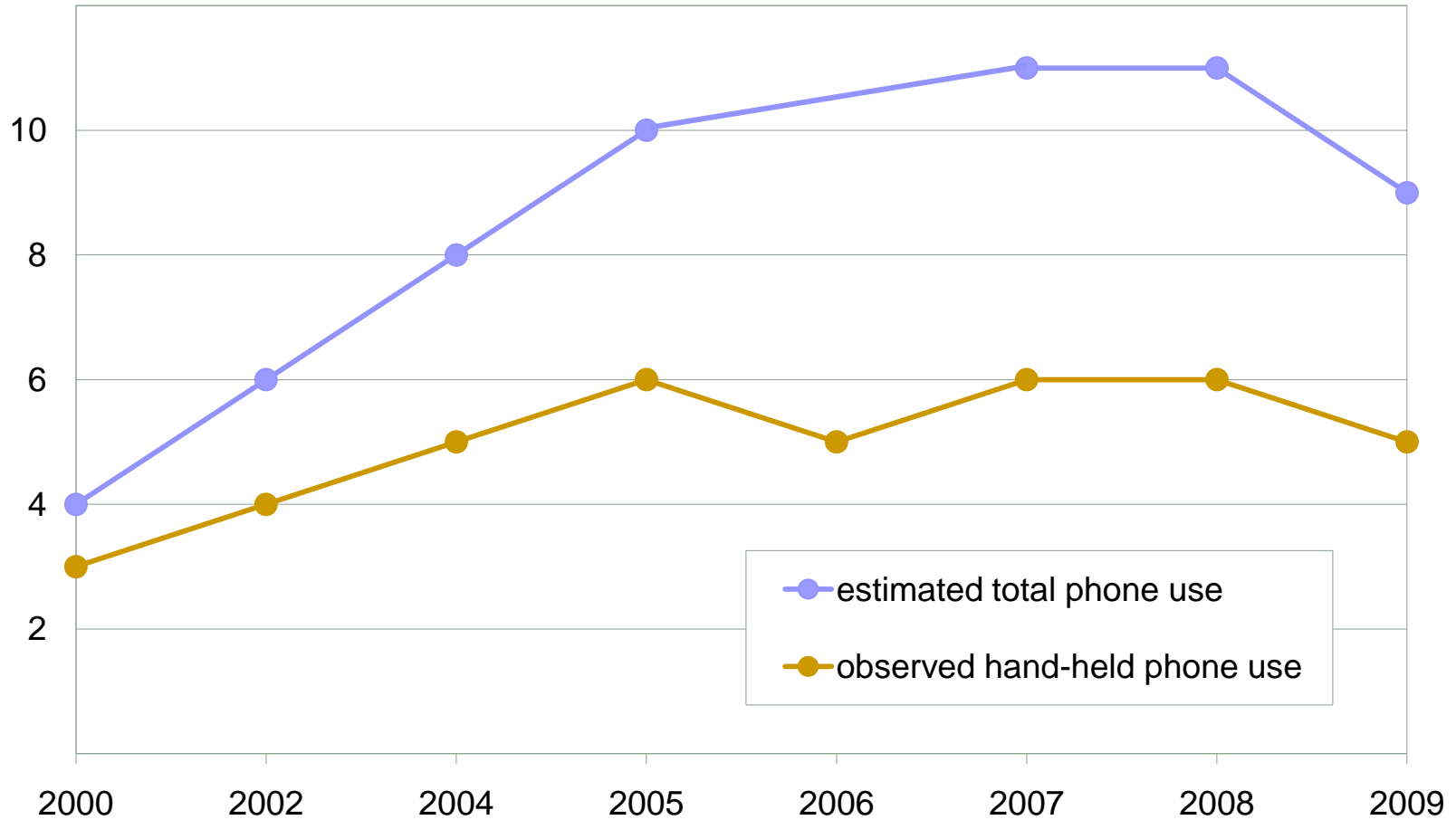
Cellphone subscribers

In millions, 1985-2010



Percent of drivers talking on phones

National Highway Traffic Safety Administration, 2000-09



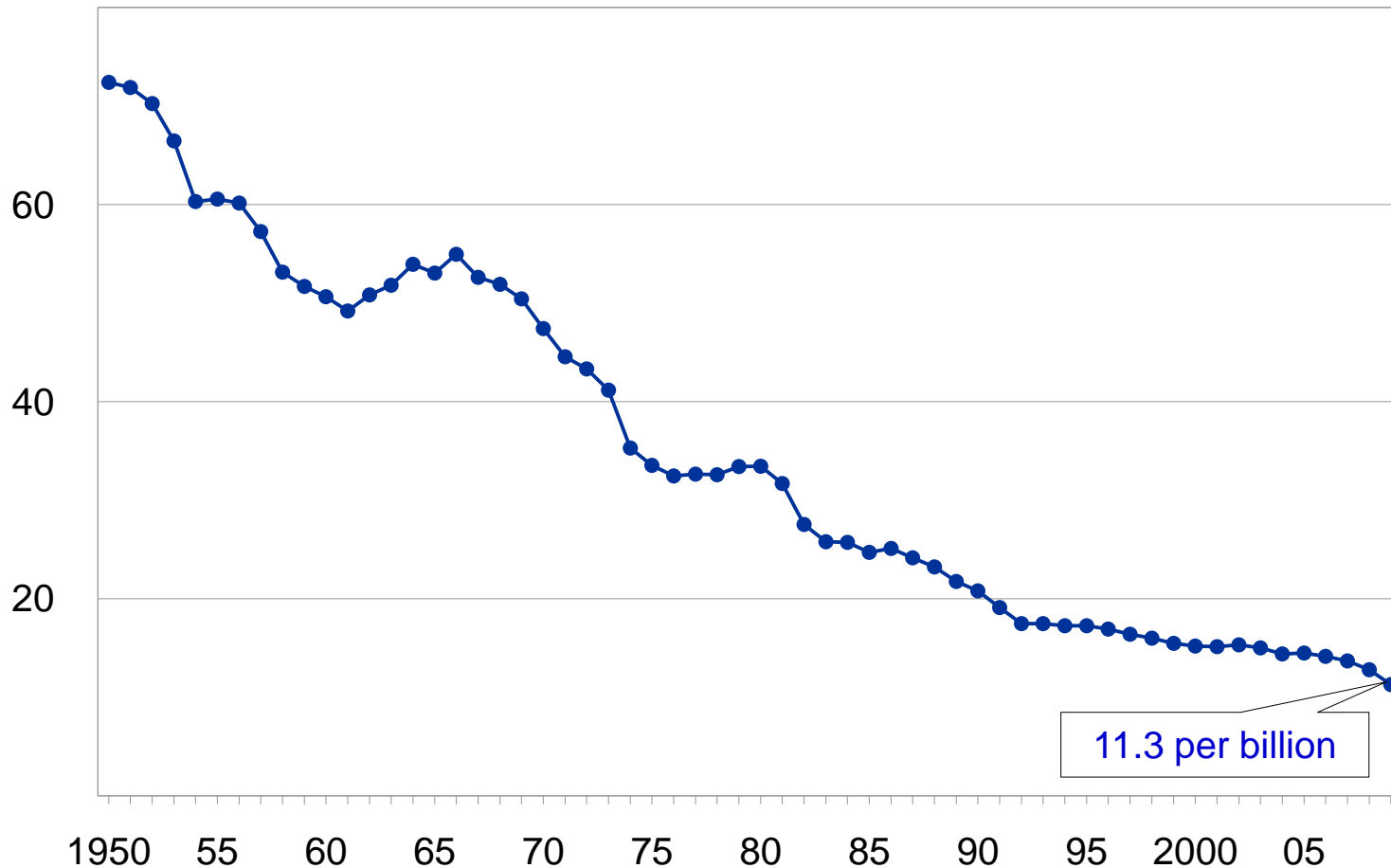
Cellphones and crash risk

- Canadian study found 4-fold increase in risk of property-damage crashes with cellphone use
- IIHS study in Western Australia found 4-fold increase in risk of injury crashes
- Both studies found similar risks for hand-held and hands-free phones

The best studies of crash risk verify crash-involved driver phone use from billing records. Because billing records are unavailable in the United States, such studies have been done in other countries.

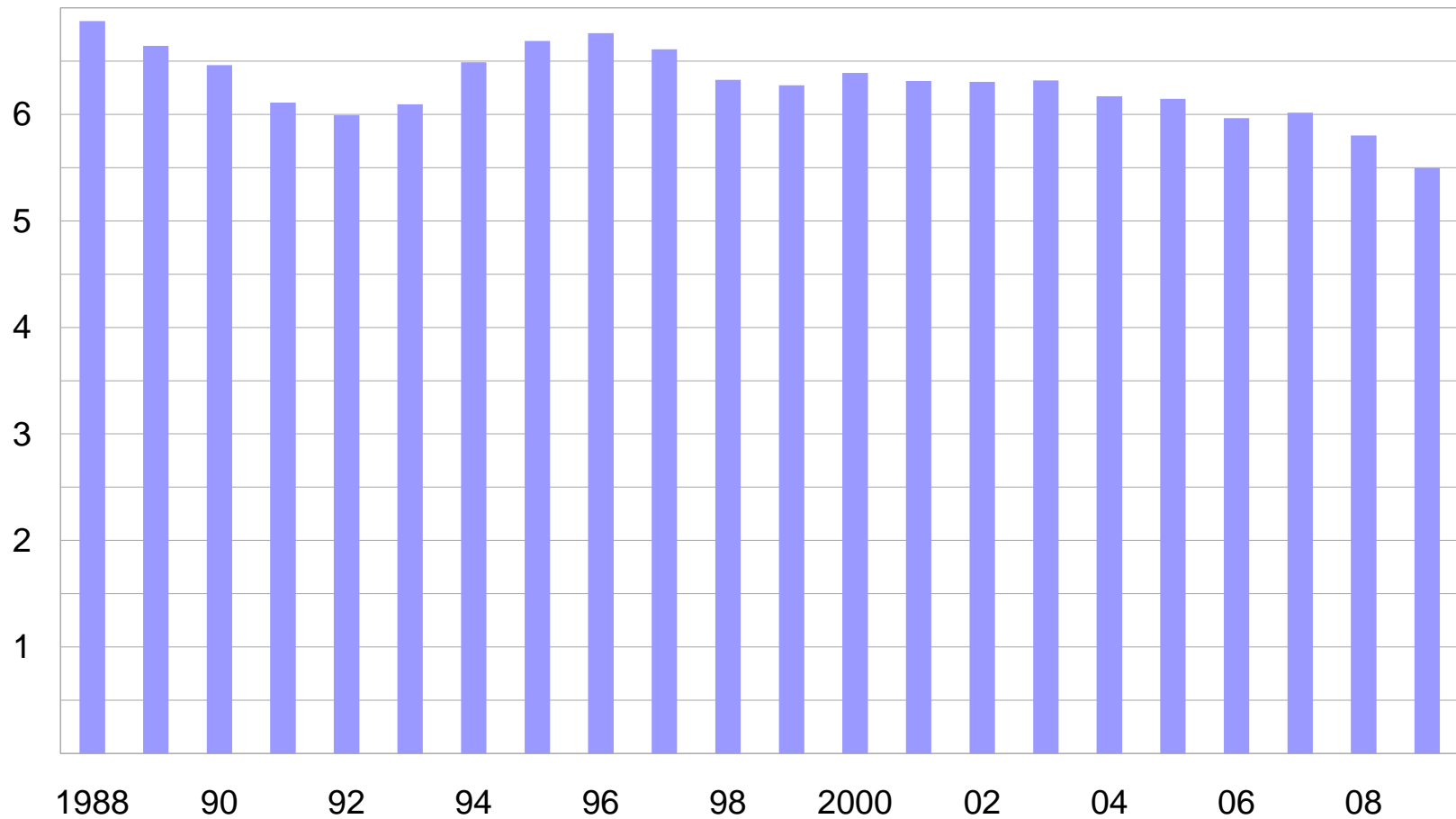
Motor vehicle crash deaths per billion miles traveled

1950-2009



All police-reported crashes

In millions, by calendar year



Collision claim frequencies

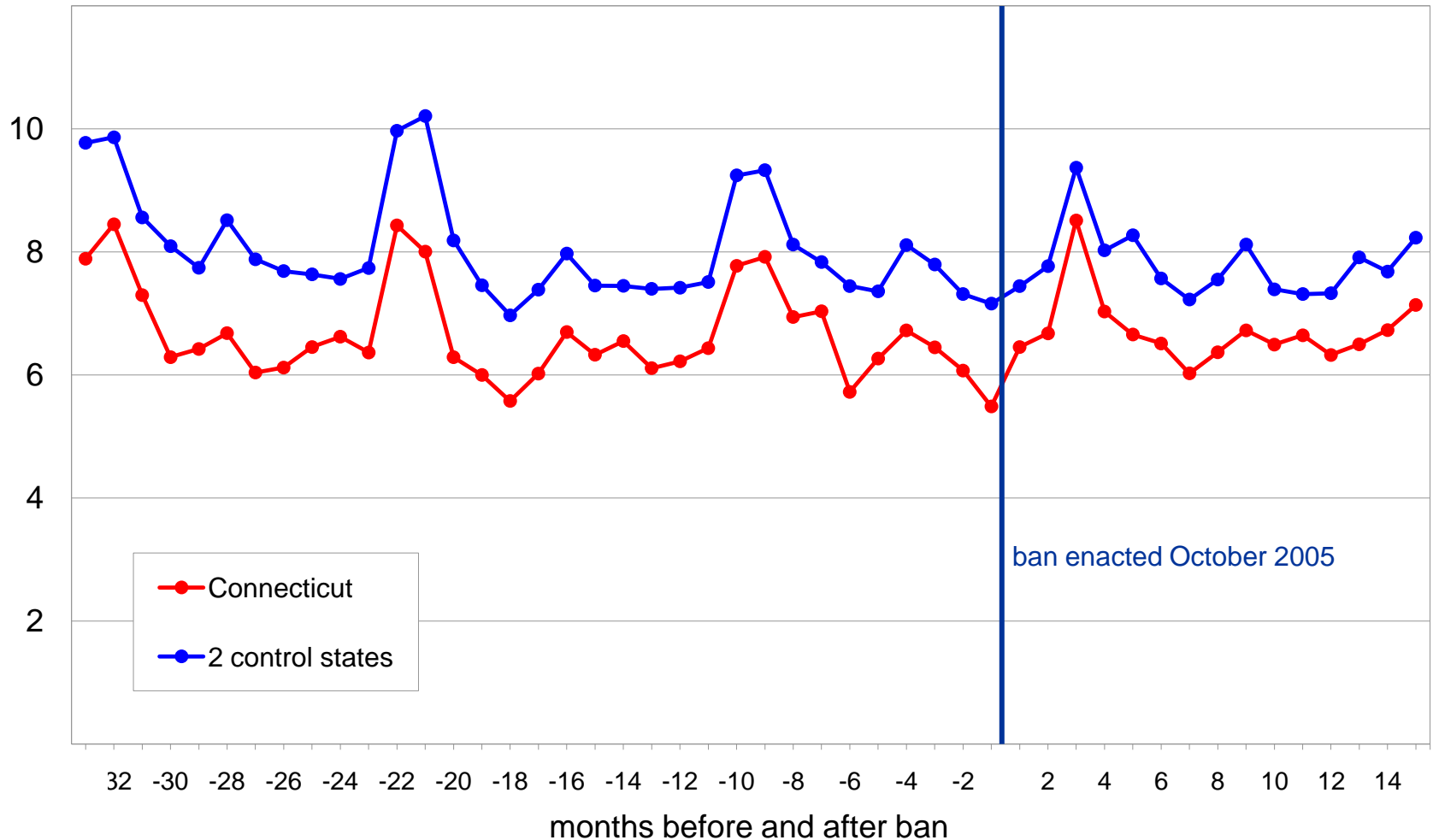
Claims per 100 insured vehicle years

By calendar year, based on 4 most recent model years



Crashes and hand-held cellphone ban in Connecticut

Collision claim frequencies by month for vehicles up to 3 years old, Connecticut vs. New York and Massachusetts



Estimated effect of hand-held cellphone bans in 4 states

Collision claim frequencies for vehicles up to 3 years old

	estimated effect vs. control states	p-value
California	-1%	0.2635
Connecticut	+4%	0.0317
Washington DC (vs. MD and VA)	-5%	0.1753
New York	+3%	0.0052

HLDI's study of handheld cellphone bans has been accepted for publication in *Chance*, a peer-reviewed journal of the American Statistical Association

Estimated effect of texting bans in 4 states

Collision claim frequencies for vehicles up to 9 years old

	estimated effect vs. control states	p-value
California	+8%	0.0001
Louisiana	+7%	0.0001
Minnesota	+9%	0.0001
Washington	+1%	0.4425

Estimated effect of texting bans in 4 states

Collision claim frequencies for vehicles up to 9 years old for rated drivers younger 25

	estimated effect vs. control states	p-value
California	+12%	0.0001
Louisiana	+8%	0.0027
Minnesota	+7%	0.0408
Washington	+5%	0.1373

Distracted driving, technology, and crashes

Distracted driving is not new

- 1979 – Indiana “Tri-Level Study” estimated “driver error” to be proximate cause of 9 out of 10 crashes
- Personal reports from drivers reveal a variety of distracting events preceding crashes
 - Changing audio tapes/CDs
 - Eating/drinking
 - Children, bugs, animals in vehicle
 - Reading, shaving, and applying makeup

Summary

- Distracted driving is not a new problem
- Mobile communication devices are a new distraction
- Research confirms that distraction from these devices increases crash risk
- Mobile communication device use in vehicles has increased
 - But we don't know if distraction has changed in amount or degree
- Overall, crash risk has not increased with increasing device use
- State laws banning some forms of use have changed use behavior but they have not reduced overall crash risk



Hedging your bets: Education

How respondents rate their driving skills compared with average US driver

February 2010

	total n = 2,024	male n = 999	female n = 1,025
much better than average	23	29	15
better than average	49	47	51
average	27	23	31
worse	1	–	1

"We know that educating people about the risk of distracted driving works,"

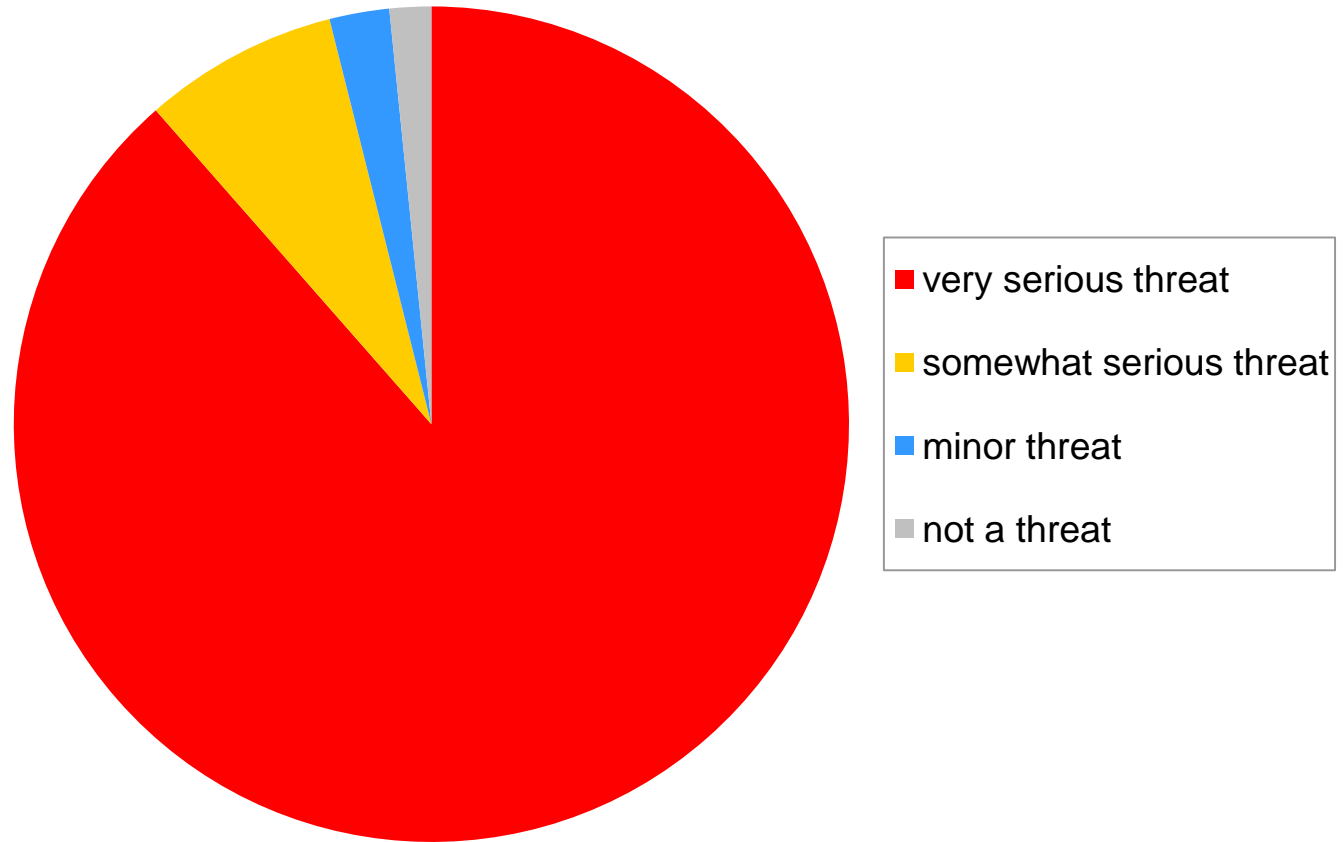
said Jim Guest, president of the nonprofit group that publishes Consumer Reports.

"This partnership is devoted to spreading the word about the dangers of distracted driving and specific steps you can take to make a difference."

—The Washington Post, March 8, 2011

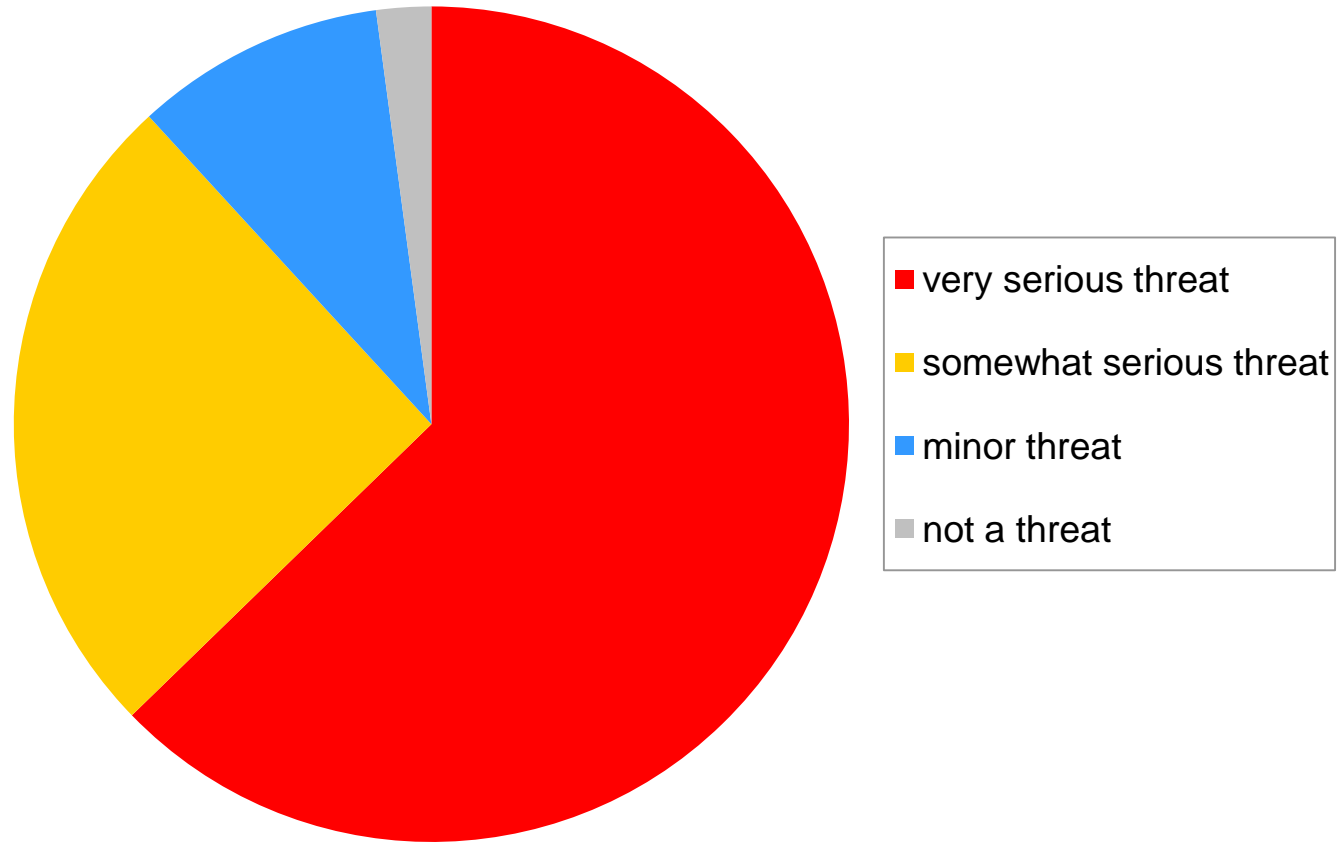
Percent of drivers who feel texting is a threat

2010 Traffic Safety Culture Index, AAA Foundation for Traffic Safety



Percent of drivers who feel talking on cellphones is a threat

2010 Traffic Safety Culture Index, AAA Foundation for Traffic Safety



Education alone is seldom an effective hedge against motor vehicle crash risk

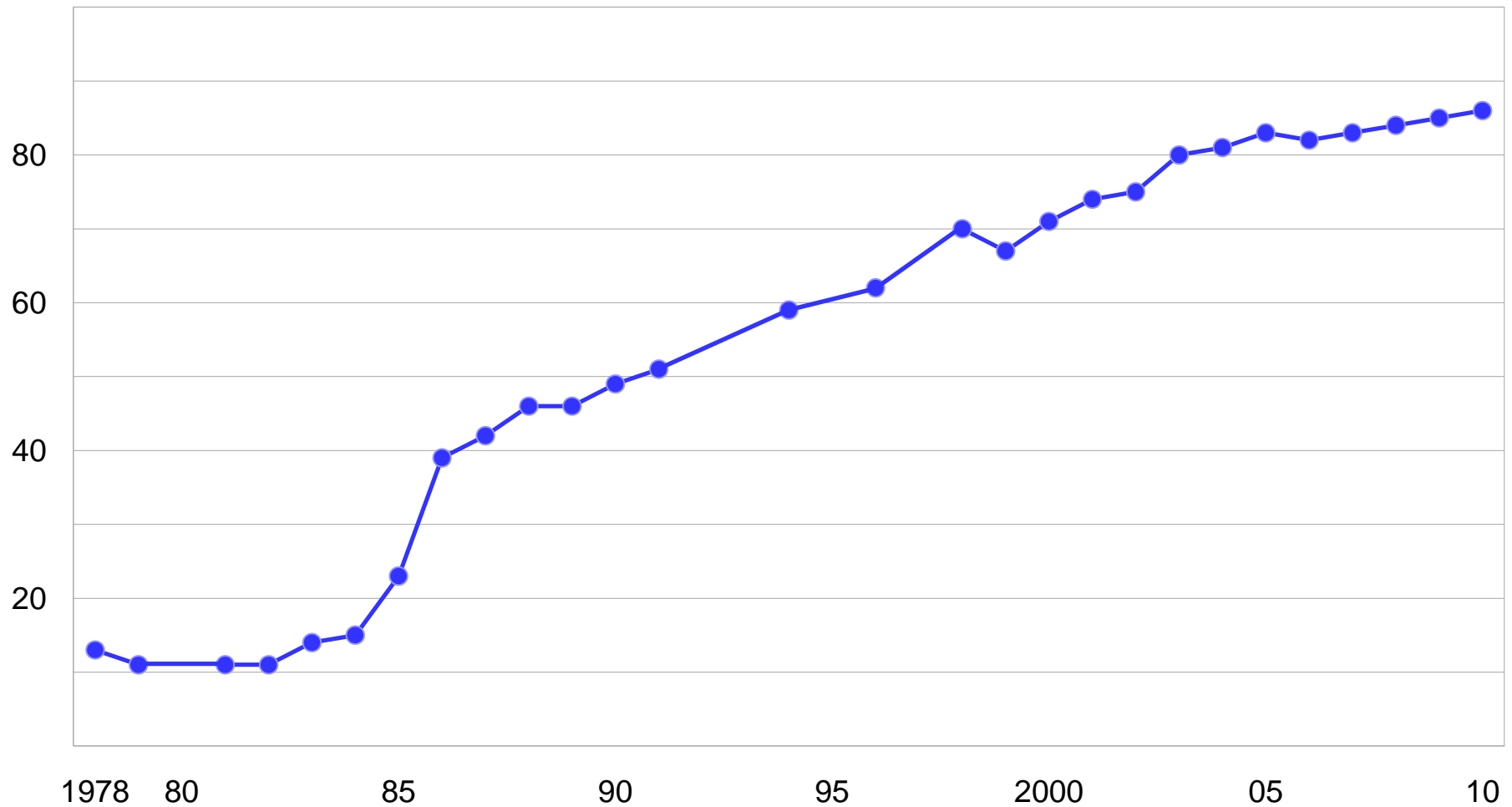
- For years, safety belts were used by only a small minority of motor vehicle occupants
 - Even though survey after survey showed that 9 out of 10 Americans knew safety belts were effective
- Only when safety belt use became law did safety belt use increase substantially



Hedging your bets: Education plus laws

Percent driver belt use in United States

1978-2010



STATUS REPORT

SPECIAL ISSUE: RED LIGHT RUNNING

INSURANCE INSTITUTE
FOR HIGHWAY SAFETY

Vol. 46, No. 1, Jan. 27, 2011

The red light runners think they've been wronged. They're convinced that the cameras documenting their violations are nothing more than a scheme to pick motorists' pockets. The truth is much simpler:

RED LIGHT RUNNING KILLS

and red light cameras save lives. In fact, they saved 159 lives in 2004-08 in the 14 biggest US cities with cameras, a new Institute analysis shows. If cameras had been operating during that period in all cities with populations of more than 200,000, a total of 815 fewer people would have died.

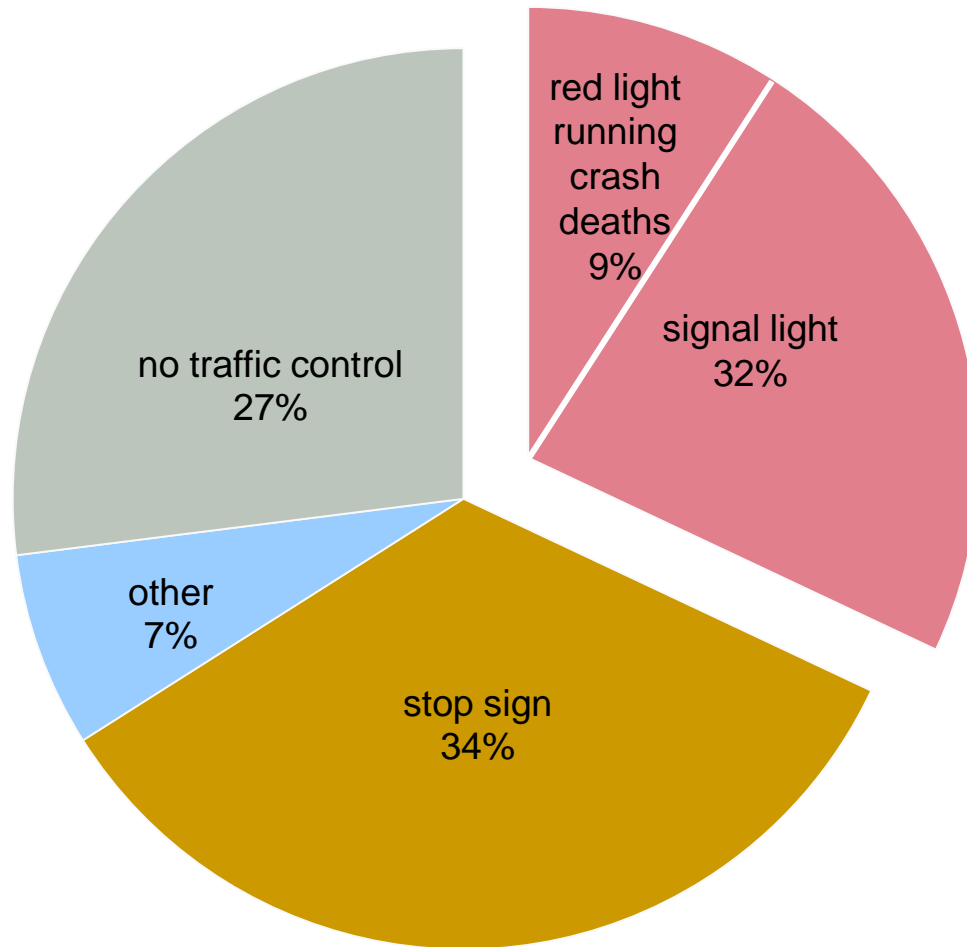
Camera opponents never acknowledge the connection between those whose red light running sets off a benign flash and those who cause a deadly collision. Instead, they argue about "big brother" and equate fines for violations with taxes on drivers.

Not everyone who runs a red light is part of this group. No doubt, most violators calmly take their lumps, paying their tickets and vowing to be more careful. But



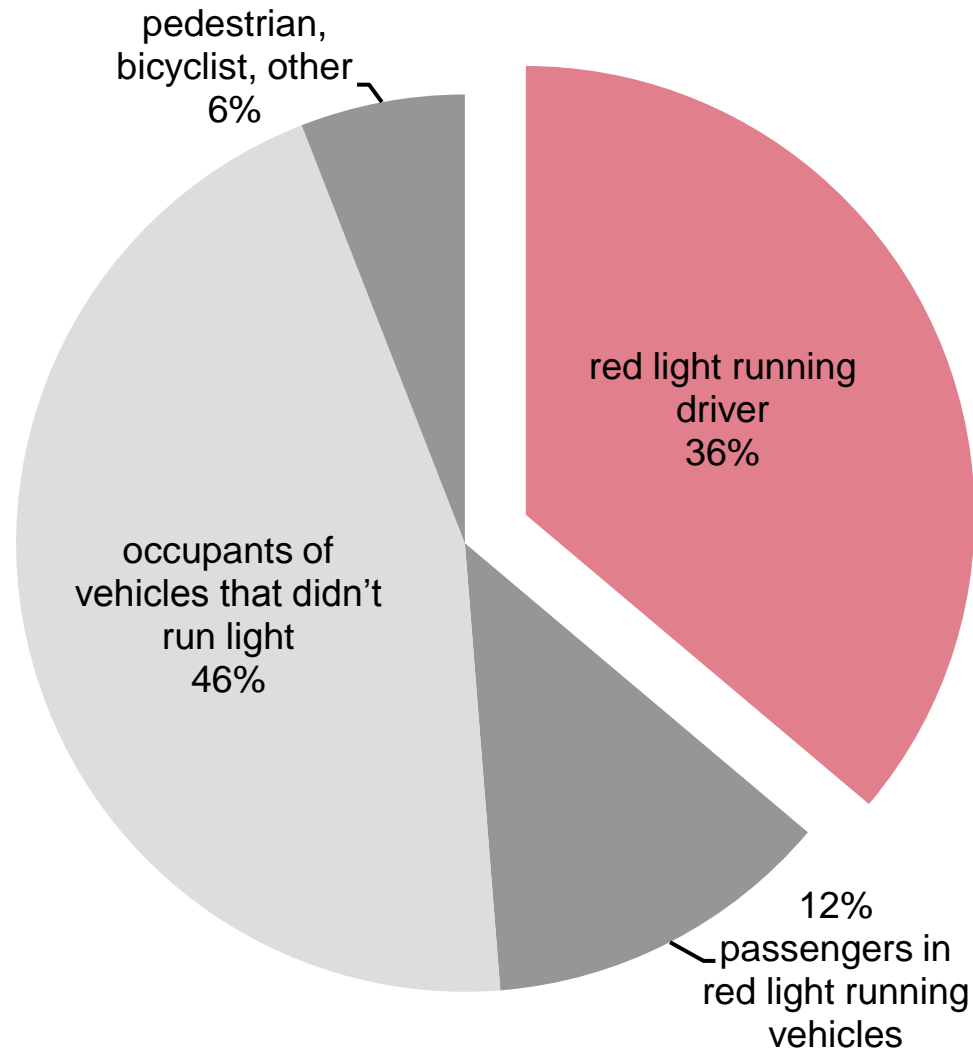
7,358 deaths at intersections in 2009

Distribution by type of traffic control

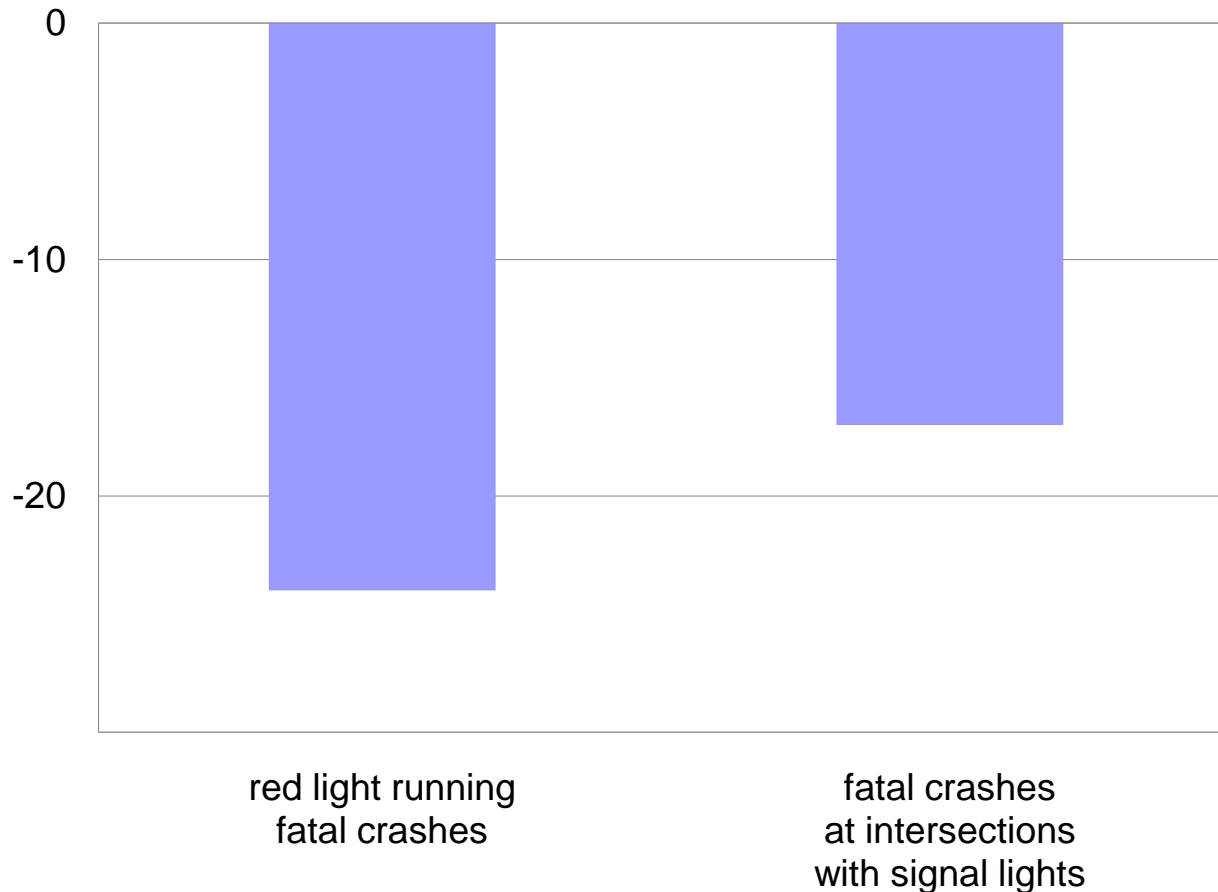


676 deaths in red light running crashes in 2009

Distribution by type of road user

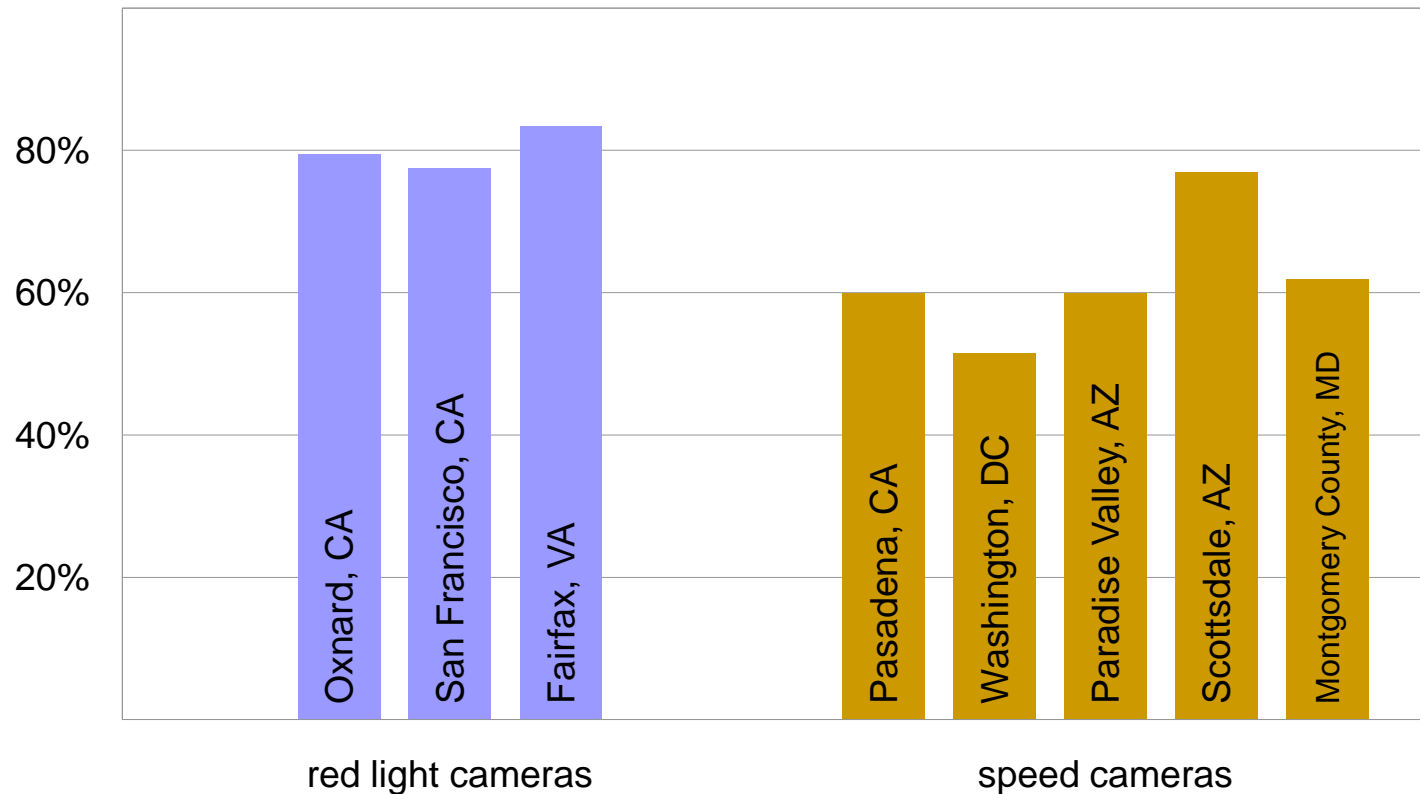


Percent difference in actual fatal crash rates during 2004-08 in cities with red light cameras vs. expected rates without cameras



Surveys show that a majority of drivers support automated enforcement

IIHS, 1990, 2000, 2003, 2008a, 2008b



Wheeling police defend red light cameras
photo enforcement is fraud
voters targeting red light cameras at poll
more questions arise concerning red light cameras not a
red-light cameras Red-...
ative agenda
Red Light Camera Blues? The App for That
Safety, not money, should be
light camera Houston voters to decide on
Despite questions Petersburg moves forward
d-Light Camera
Opposition weighs some red light offences
More red-light camera questions
It's Official: Red Light Cameras Don't Work
Aventura cites safety in defending camera program

Stop whining over red-light cameras



Technology to change the vehicle and environment

1959 Chevrolet Bel Air and 2009 Chevrolet Malibu

Highway safety: then and now



40 mph frontal offset crash test

1959 Chevrolet Bel Air and 2009 Chevrolet Malibu

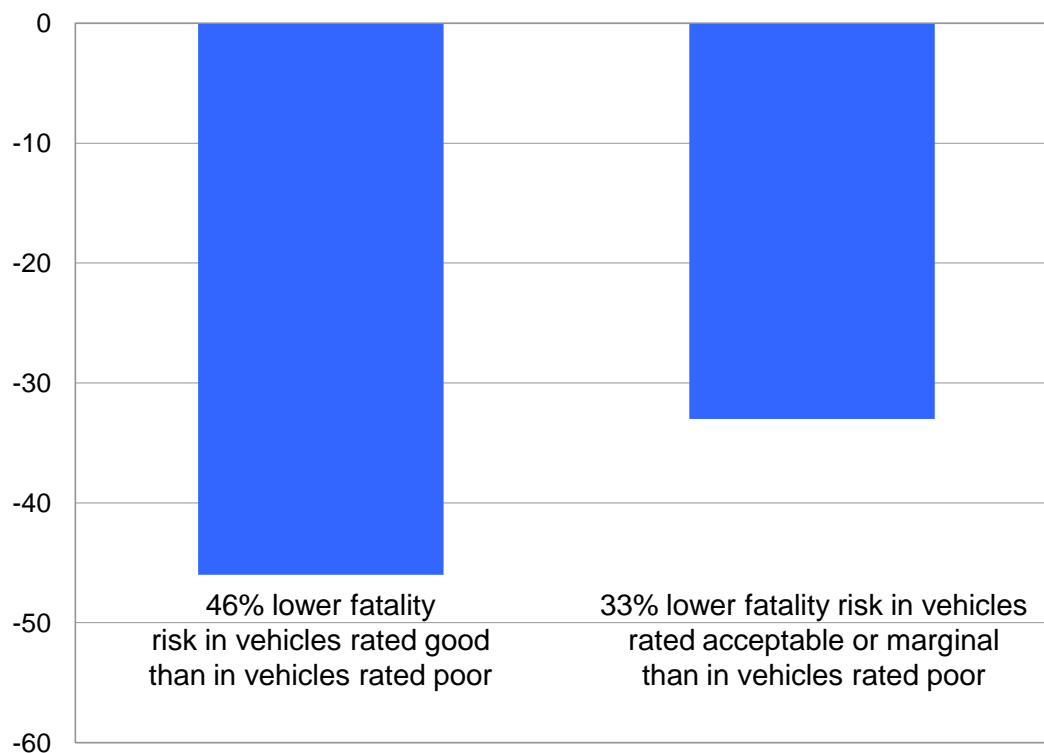
The logo for the Insurance Institute for Highway Safety (IIHS) is centered on a black rectangular background. It features the words "INSURANCE INSTITUTE" in white, serif, all-caps font, positioned above a thin white horizontal line. Below the line, the words "FOR HIGHWAY SAFETY" are written in white,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

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Fatality risk in real-world crashes

Percent driver fatality risk reduction in head-on crashes, by IIHS crash test rating

The risk of death is much lower in vehicles rated good based on IIHS tests, compared with vehicles rated poor.



Fatality risk in side impacts

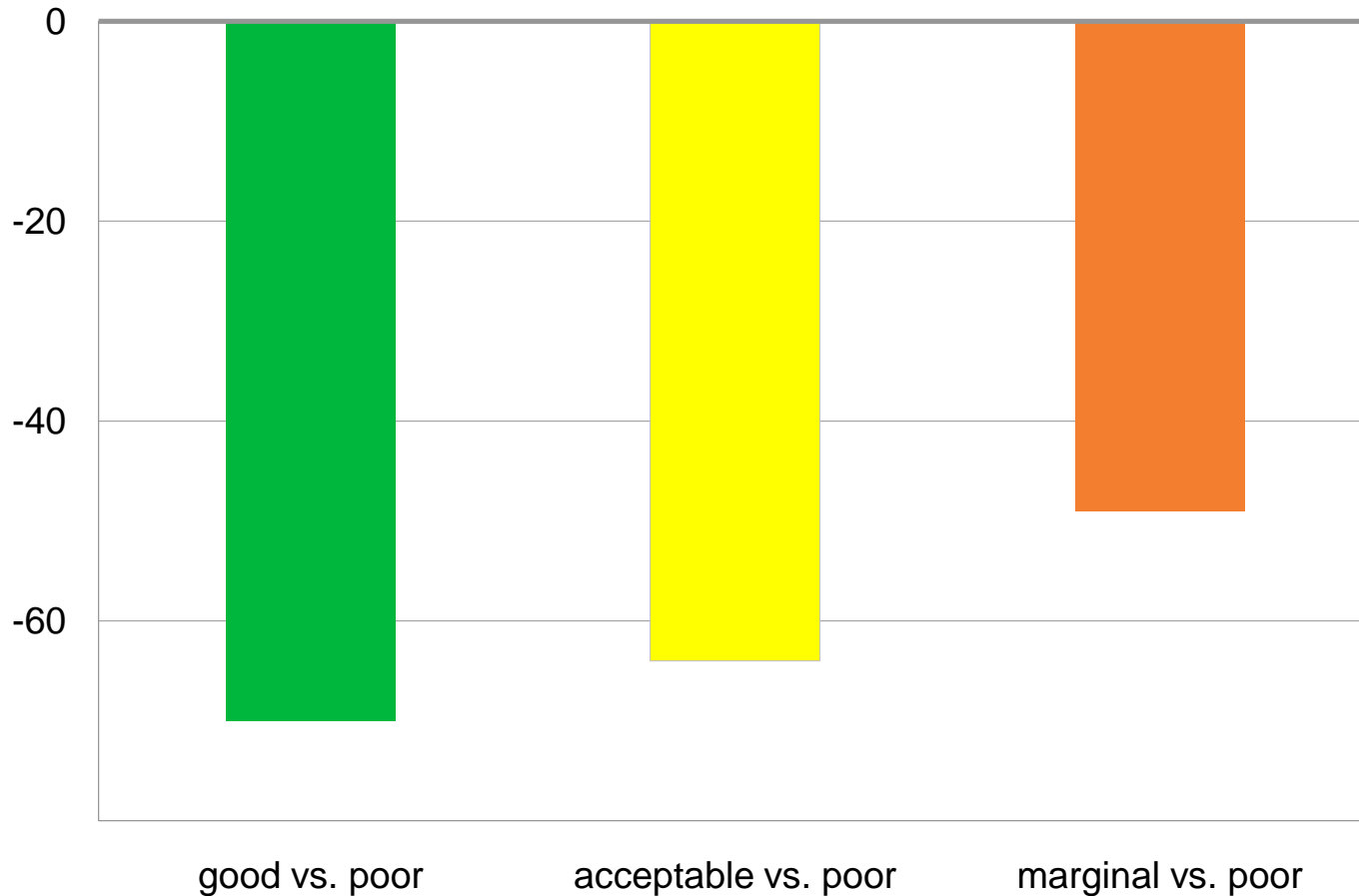
Estimated percent reductions in driver fatality risks in vehicles with side airbags, 2000-04

IIHS research shows side airbags save lives. In real-world side impacts, driver fatality risk is 37% lower in cars and 52% lower in SUVs with side airbags with head protection, compared with similar vehicles without this protection.



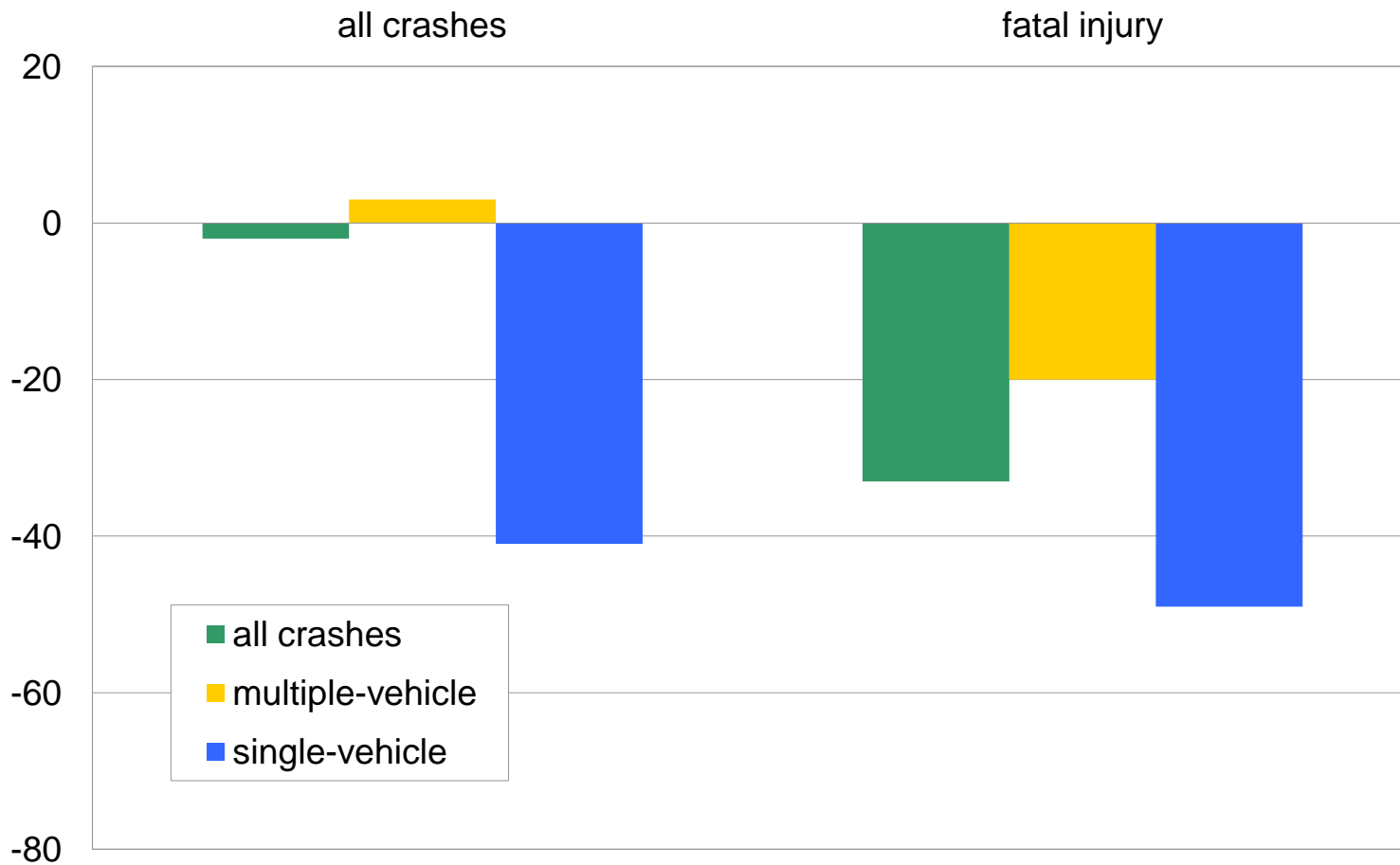
Percent reduction in risk of driver death in left side impacts by driver-only rating

Adjusted for age and gender, and vehicle type and curb weight



Effects on crash risk

Percent change in crash rates for vehicles with standard ESC vs. optional or no ESC, updated May 2010



Roundabouts are safer and more efficient



If 10 percent of signalized intersections in the United States were converted to roundabouts

- Approximately 70,000 crashes prevented annually including:
 - 450 fatal crashes
 - 45,000 injury crashes
- Vehicle delays reduced by about 800 million hours
- Fuel consumption reduced by more than 500 million gallons

Some people complain that roundabouts are too complex, but compared to what?!

- Wide streets encourage high speeds and require long crossing distances for pedestrians



Vehicle technology to change behavior

Breath alcohol ignition interlocks

Technology for preventing impaired driving

- Installed in vehicles of drivers convicted of DWI
- Reduce recidivism by about 65% while on vehicle
- Intrusive and cumbersome
- Not suitable for use in all vehicles
- Required primarily for repeat offenders and offenders with BACs

Potential advanced technology: tissue spectrometry

- Estimates BAC by measuring light absorption at a particular wavelength based on measurements of light reflection from skin
- Touch-based systems require skin contact

Potential advanced technology: distant spectrometry

- Uses “sniffer” to detect alcohol in vehicle
- Nondispersive infrared measurement of alcohol concentration in exhaled breath in vehicle compartment
- Measures concentration of alcohol and carbon dioxide near driver

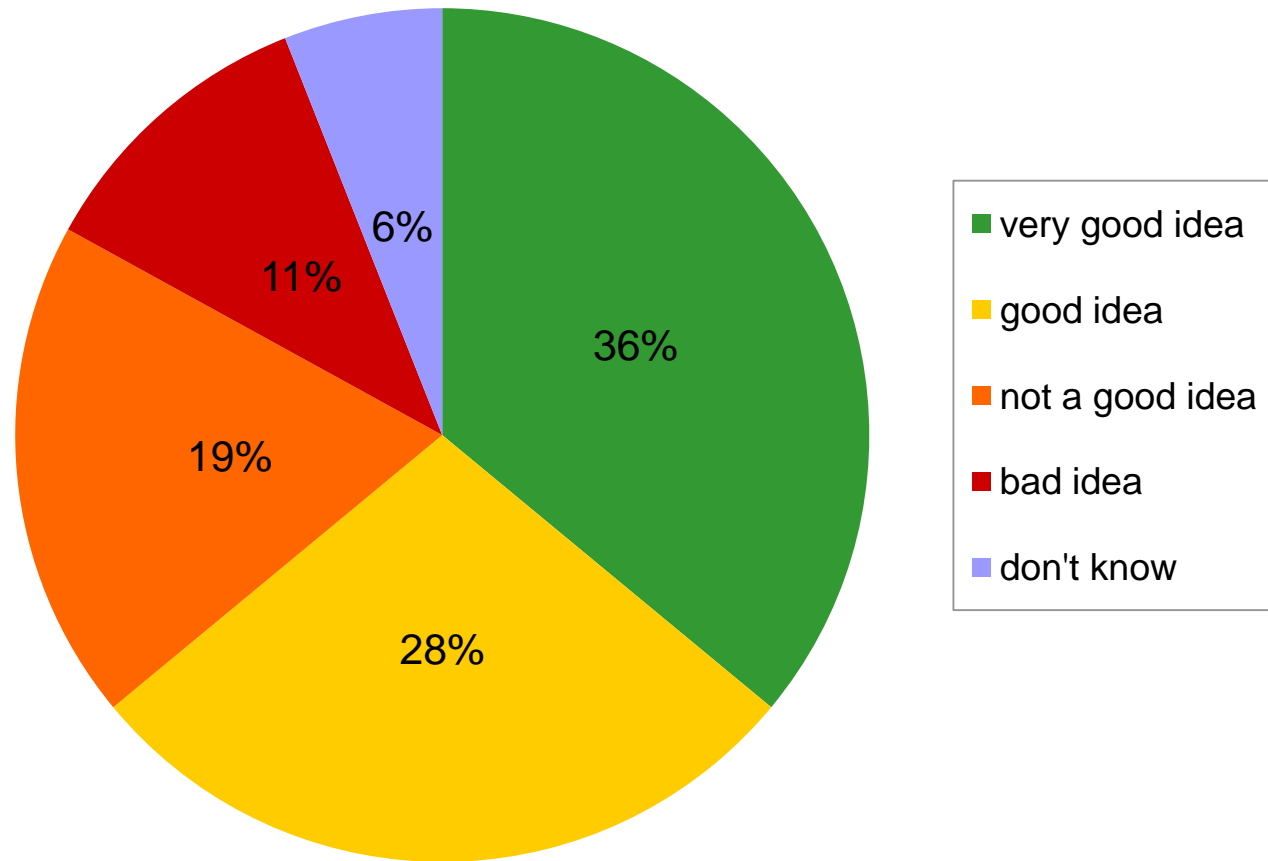
Driver alcohol detection system for safety

- Partnership between federal government and automakers
- 5-year initiative
 - Research, develop, and test advanced alcohol detection technology suitable for all vehicles
 - Build public support for vehicle-based approach
- 3 companies selected to develop prototype systems

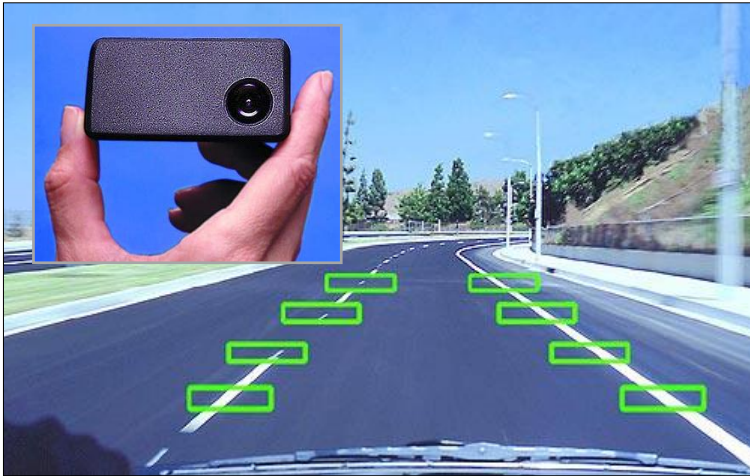


Attitudes toward advanced alcohol test technology in all vehicles, if technology shown to be reliable

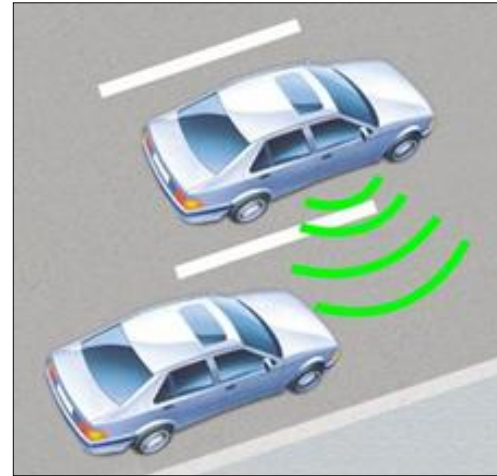
National telephone survey, 2009



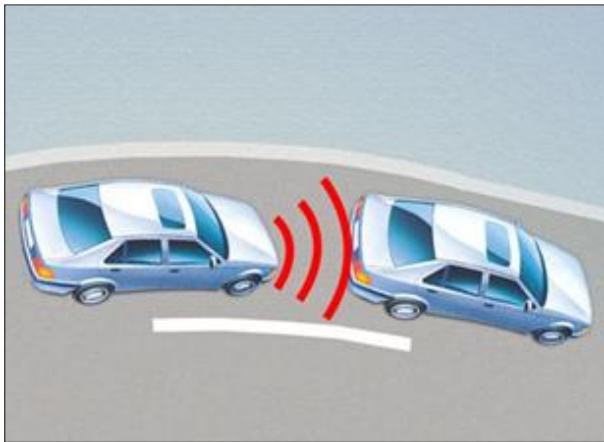
Advanced information technology for safety



lane departure prevention



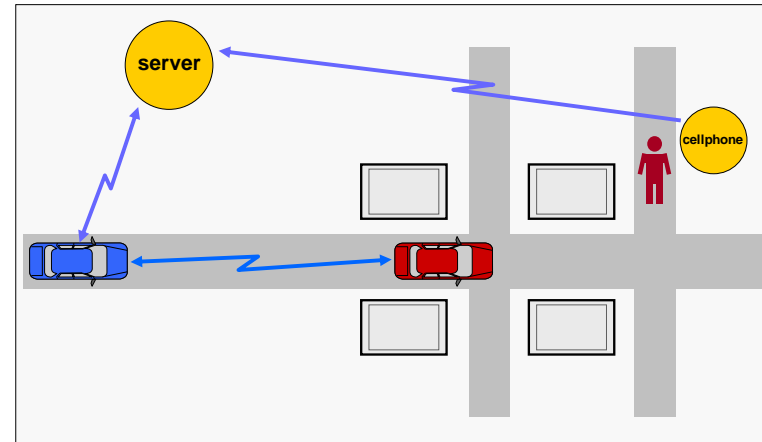
blind spot detection



forward collision warning
and auto braking



adaptive headlights



vehicle-to-vehicle communication



Technology: the best way to
hedge your bets on the highway

Floor mat and/or accelerator pedal recalls

Collision claim frequencies relative to size/style class

vehicle	model years	vehicle size class/ frequency ratio
Toyota Prius Hybrid	2007-09	0.82
Pontiac Vibe 4WD	2009	0.84
Pontiac Vibe 2WD	2009	0.88
Toyota Highlander 2WD	2009	0.93
Toyota Avalon	2007-09	0.94
Toyota Sienna 2WD	2004	0.97
Lexus IS 350 2WD	2007-09	0.99
Lexus ES 350	2007-09	1.00
Toyota Tacoma 2WD	2007-09	1.00
Toyota Camry Hybrid	2009	1.01
Toyota Venza 2WD	2009	1.02
Toyota Tacoma 4WD	2007-09	1.03
Toyota Corolla	2009	1.04
Toyota Camry	2007-09	1.04
Toyota Highlander 4WD	2009	1.05

vehicle	model years	vehicle size class/ frequency ratio
Toyota Sequoia 2WD	2008	1.05
Toyota Sienna 4WD	2004	1.06
Lexus IS 250 2WD	2007-09	1.07
Toyota Matrix 2WD	2009	1.07
Toyota Venza 4WD	2009	1.07
Lexus IS 250 4WD	2007-09	1.14
Toyota Matrix 4WD	2009	1.15
Toyota RAV4 4WD	2009	1.15
Toyota RAV4 2WD	2009	1.18
Toyota Tundra 2WD	2007-09	1.20
Toyota Tundra 4WD	2007-09	1.20
Lexus IS F	2008	1.20
Toyota Highlander 4WD Hybrid	2009	1.23
Toyota Sequoia 4WD	2008	1.27

Comparison of American and Canadian guard tests



American



Canadian



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