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FOR HIGHWAY SAFETY

HIGHWAY LOSS  
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## Patterns of Seat Belt Use Among Teenagers and Effective Countermeasures

TRB 93rd Annual Meeting  
Washington, DC • January 14, 2014

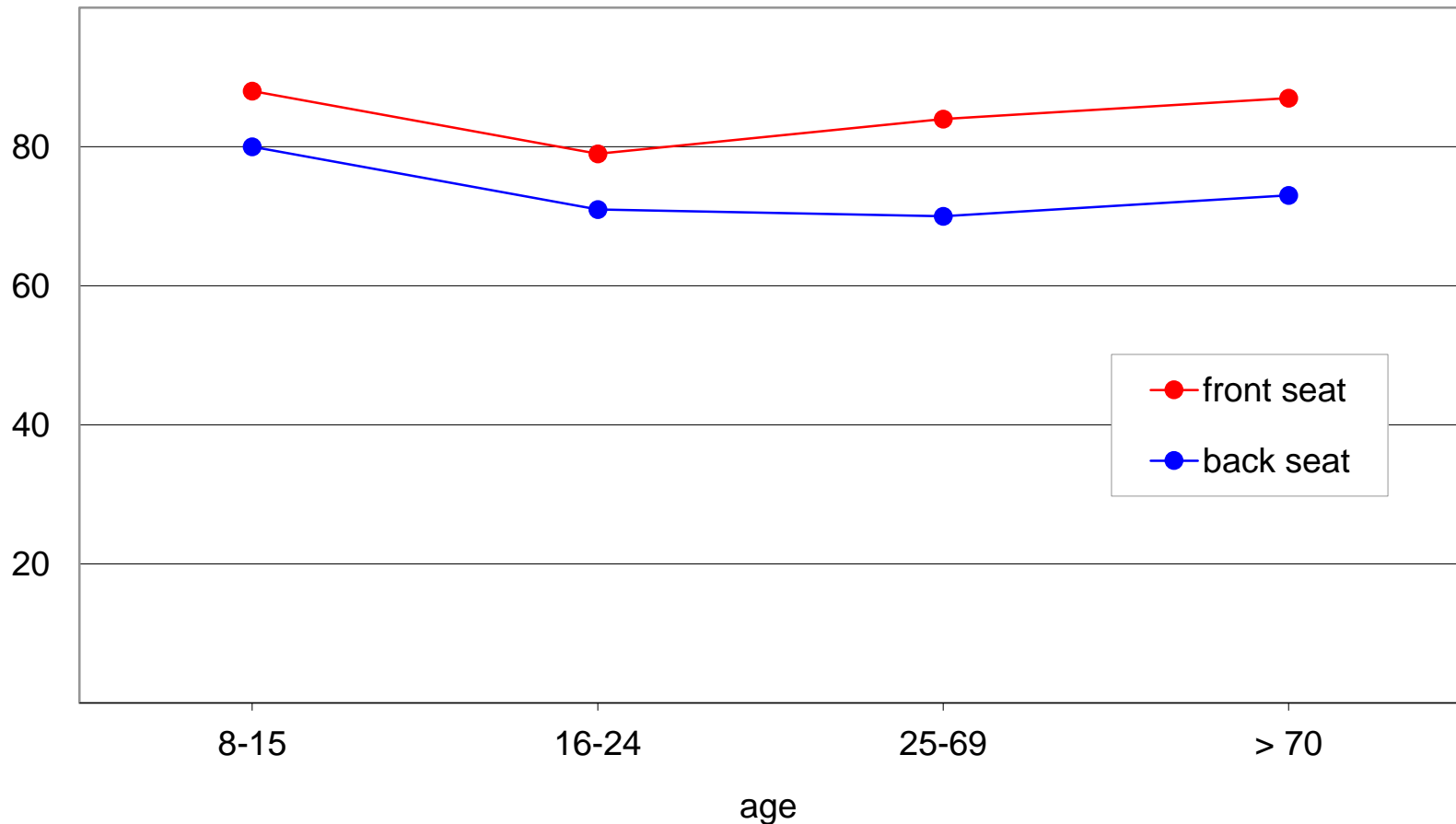
Anne T. McCartt  
Angela H. Eichelberger



## Prevalence and factors associated with belt use

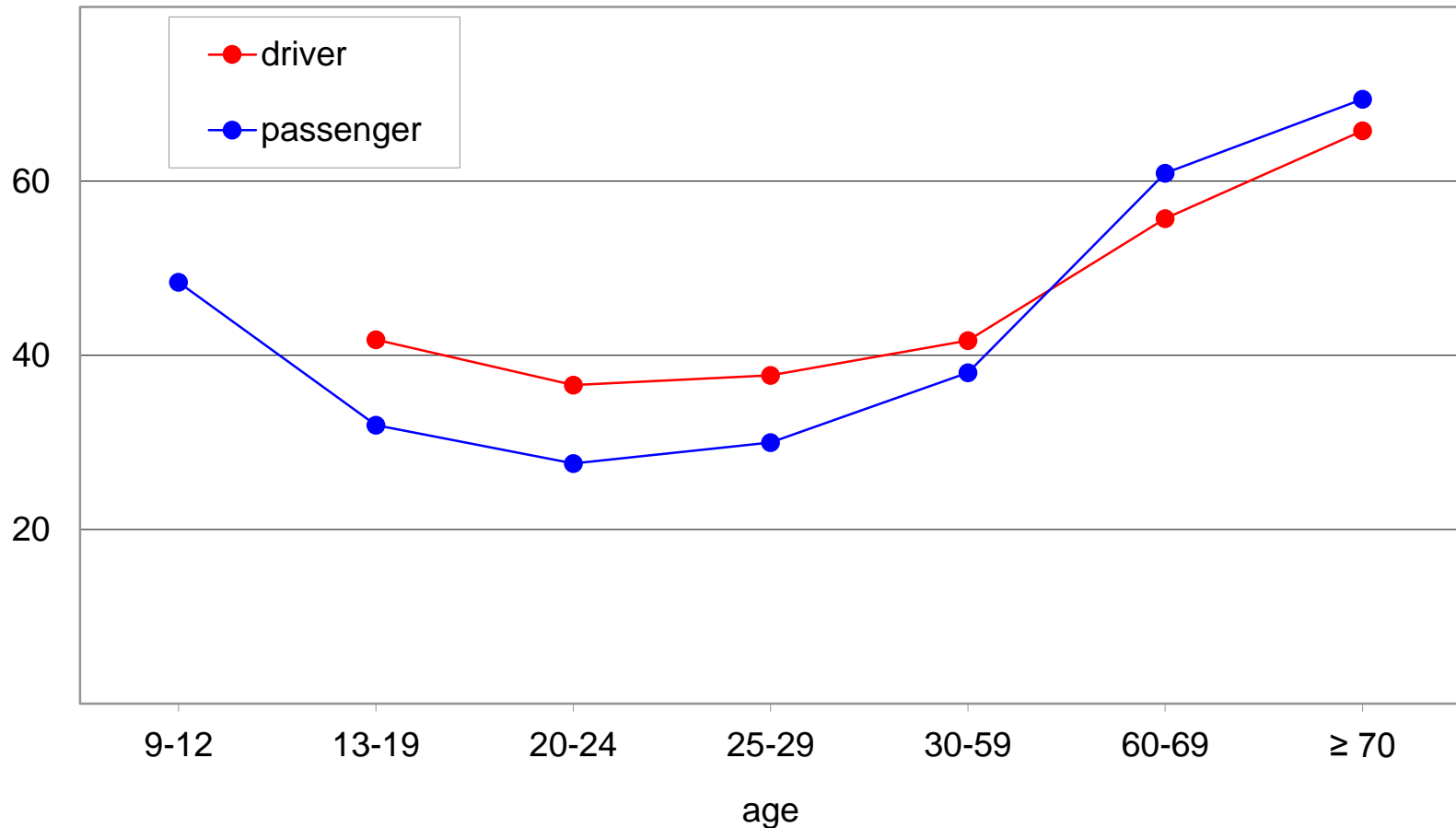
# Observed daytime seat belt use rates in passenger vehicles, by estimated age and seating position

NOPUS, 2011



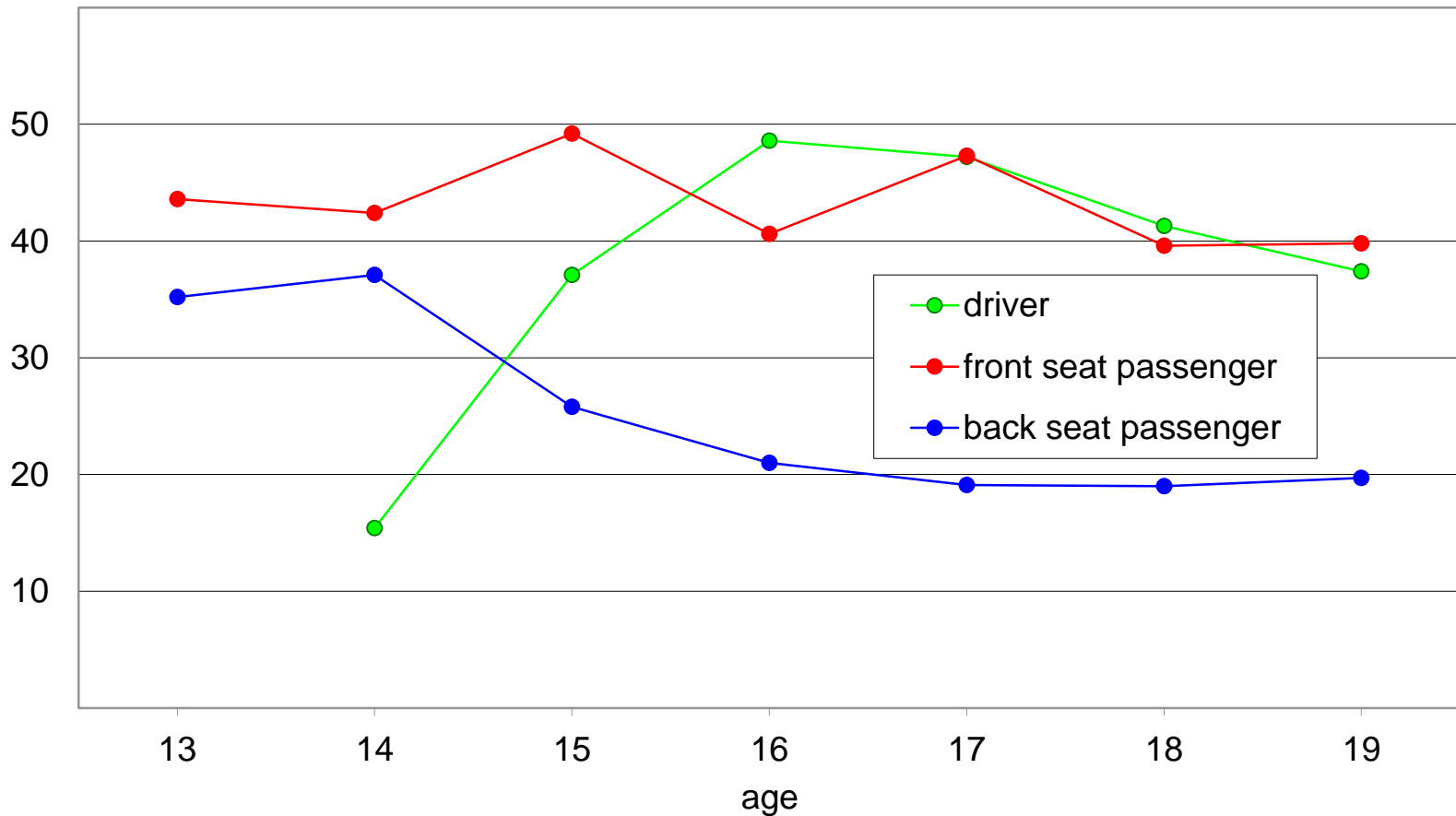
# Seat belt use rates among fatally injured passenger vehicle occupants, by age and seating position

FARS, 2012



# Seat belt use rates among fatally injured teenage passenger vehicle occupants, by age and seating position

FARS, 2011-12



# Belt use rates among fatally injured passenger vehicle drivers ages 13-19 by driver characteristics, 2012

male drivers	39
female drivers	48
drivers with positive BACs	27
drivers with zero BACs	47
drivers who were speeding	37
drivers not speeding	46
drivers with driver error	41
drivers without driver error	44
unlicensed drivers	31
drivers with permit or license	43

# Belt use rates among fatally injured passenger vehicle drivers ages 13-19 by crash characteristics, 2012

	percent wearing belt
nighttime (9 p.m. – 5:59 a.m.) crash	33
daytime (6 a.m. – 8:59 p.m.) crash	48
zero teen passengers	41
1 teen passenger	46
2 or more teen passengers	38



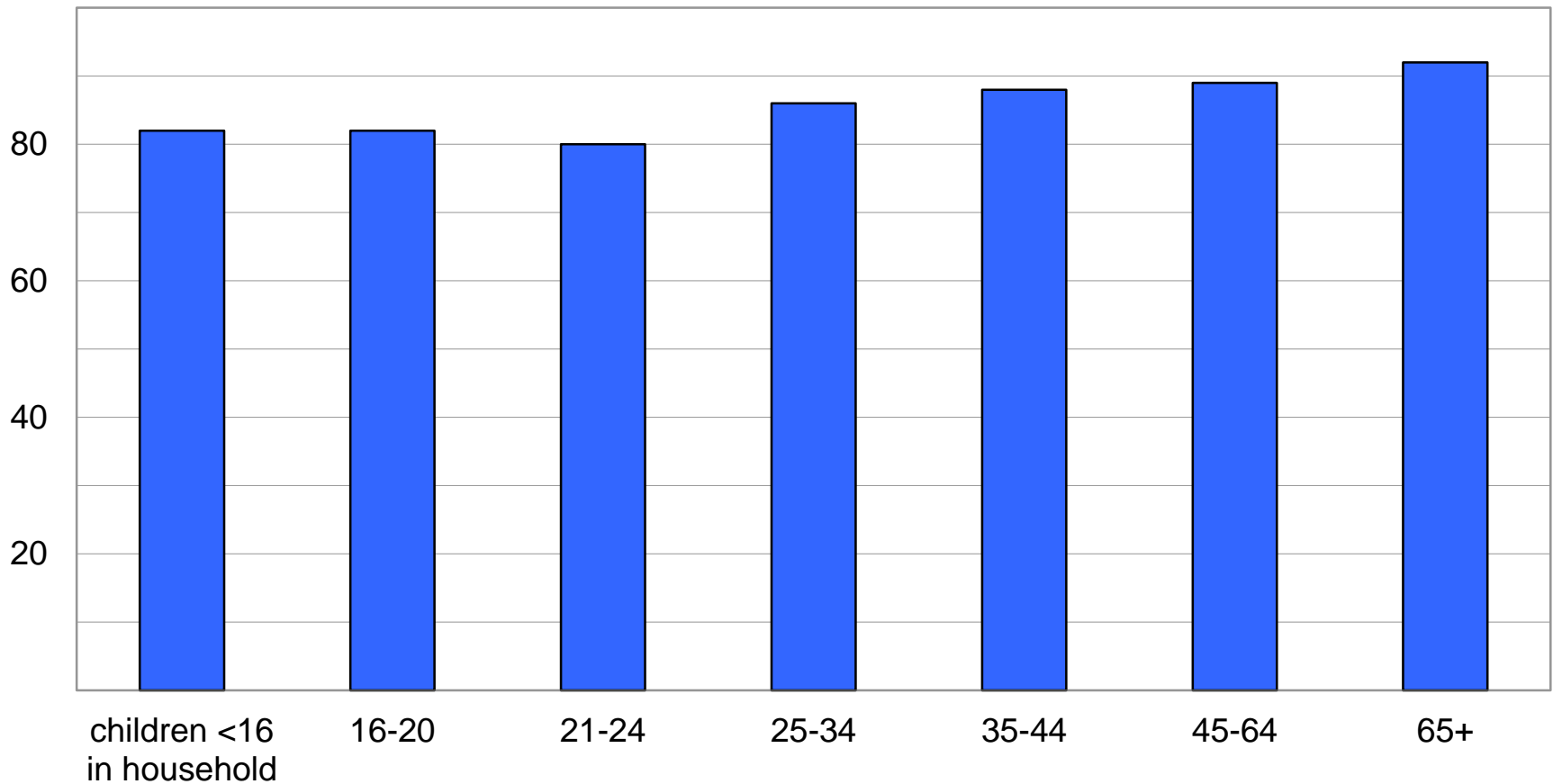
# Factors associated with belt use among fatally injured 16-19 year old drivers, 1995-2000

McCartt and Northrup, 2004

- Lower belt use associated with increasing age, male drivers, older vehicle, late night crash, rural roadway, pickup or van/SUV vs. car, BAC of 0.10 percent or higher, increasing number of teen passengers, passenger 20-29 vs. 30 and older or no adult passenger

# Percent of telephone survey respondents reporting they always use seat belts, by age

NHTSA, 2007



# Percent of survey respondents who agree with statements about belt use, by age

NHTSA, 2007

	age group		
	16-20	21-64	65+
Seat belts just as likely to harm as help	44	34	31
Putting on belt makes worry more about being in accident	26	14	12
Accident close to home usually not as serious as accident farther away	28	14	20
Would feel self-conscious around friends if wore belt and they did not	27	20	22

# Reasons that survey respondents said they sometimes do not buckle up, by age (percent)

NHTSA, 2007

	age group		
	16-20	21-64	65+
driving short distance	61	59	60
forget	68	50	52
in a rush	44	39	35
uncomfortable	47	33	31

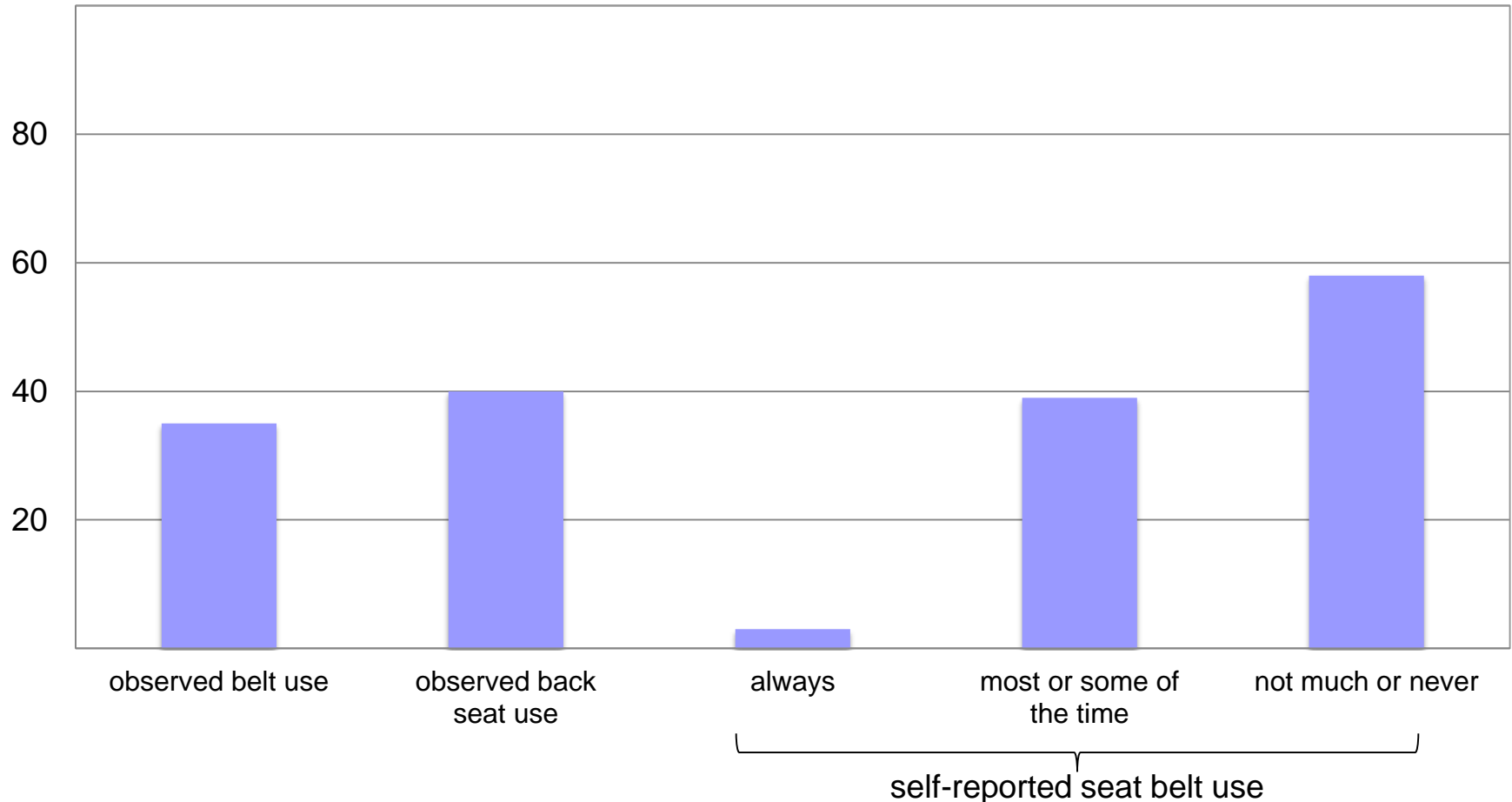
# Youth Risk Behavior Surveillance Survey

CDC, 2011

- Nationwide, 8 percent of high school students reported rarely or never wearing a seat belt as a passenger.
- Prevalence of rarely/never wearing a seat belt was higher:
  - Among males (9%) than females (6%)
  - Among black (10%) and Hispanic (9%) than white (6%) students
  - Among 9th-grade (10%) than 10th-grade (8%), 11th-grade (6%), and 12th-grade (7%) students
- From 1991-2011, rarely/never wearing a belt declined from 26 to 8 percent.

# Percent seat belt use among 8-12 year olds at four economically disadvantaged elementary schools in Virginia

Will, Dunaway, Lorek, 2013





# Proven general population strategies

# Safety belt use has increased in large part due to publicized enforcement programs

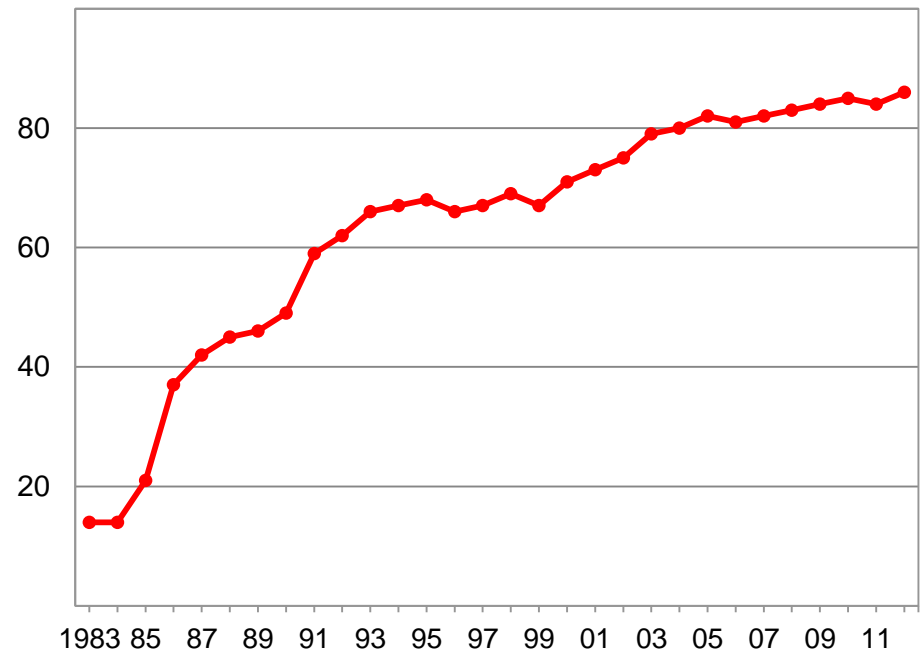


**STATUS REPORT**  
INSURANCE INSTITUTE FOR HIGHWAY SAFETY  
Vol. 44, No. 7, July 11, 2009

**IT'S SIMPLE  
CLICK IT OR TICKET**

Sixteen years into this US belt enforcement program and its blunt message still resonates. A record 83 percent of front seat occupants buckled up in 2008, thanks largely to Click It or Ticket. Considering only 73 percent used belts just 7 years earlier, the gain is impressive. More than 91,000 people have survived crashes since 2002 in the United States because of belts, federal data show. Primary laws help, too. Arkansas, Florida, Minnesota, and Wisconsin are the latest states to allow police officers to stop and ticket motorists solely for

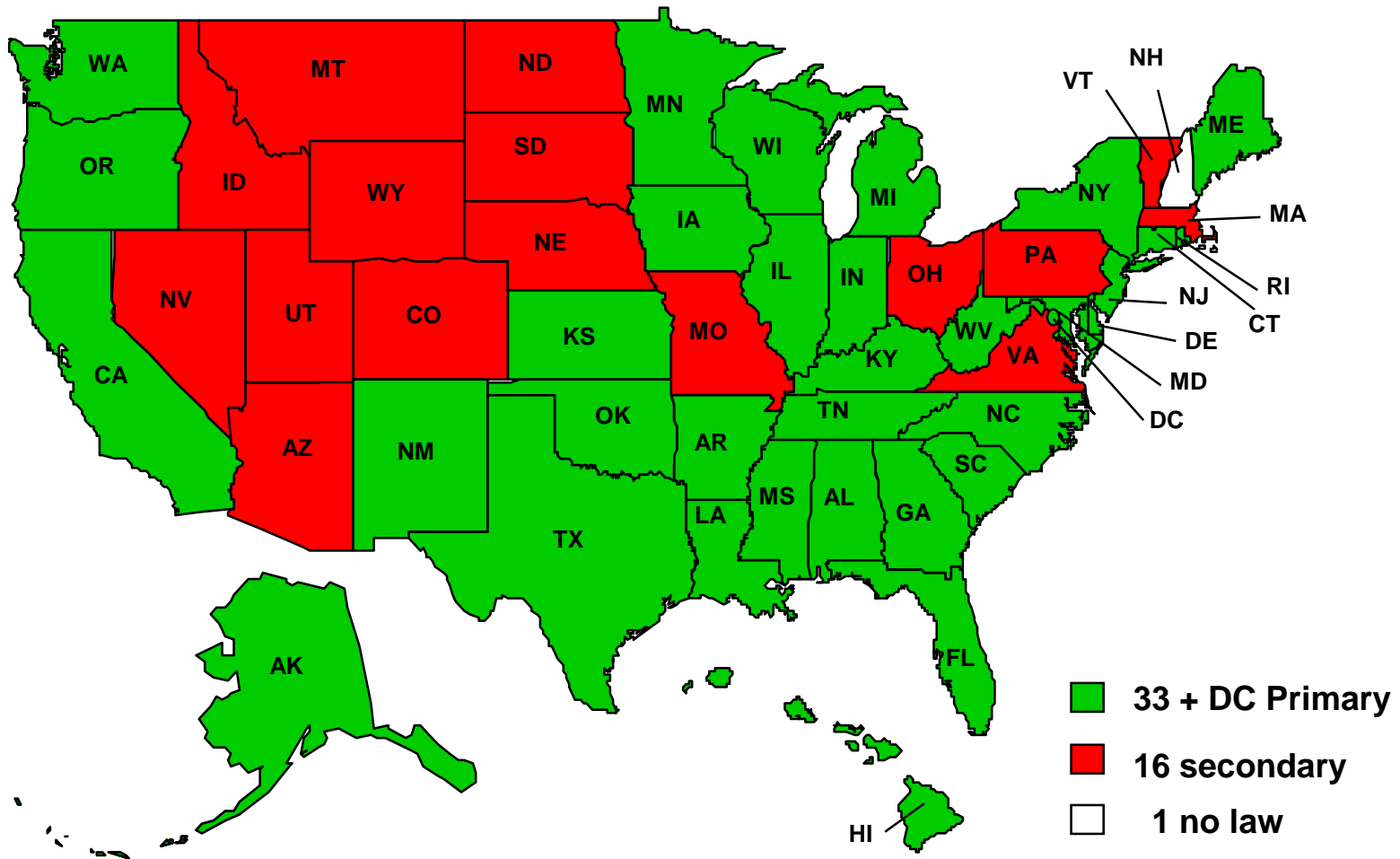
Percent of front seat occupants using belts, 1983-2012





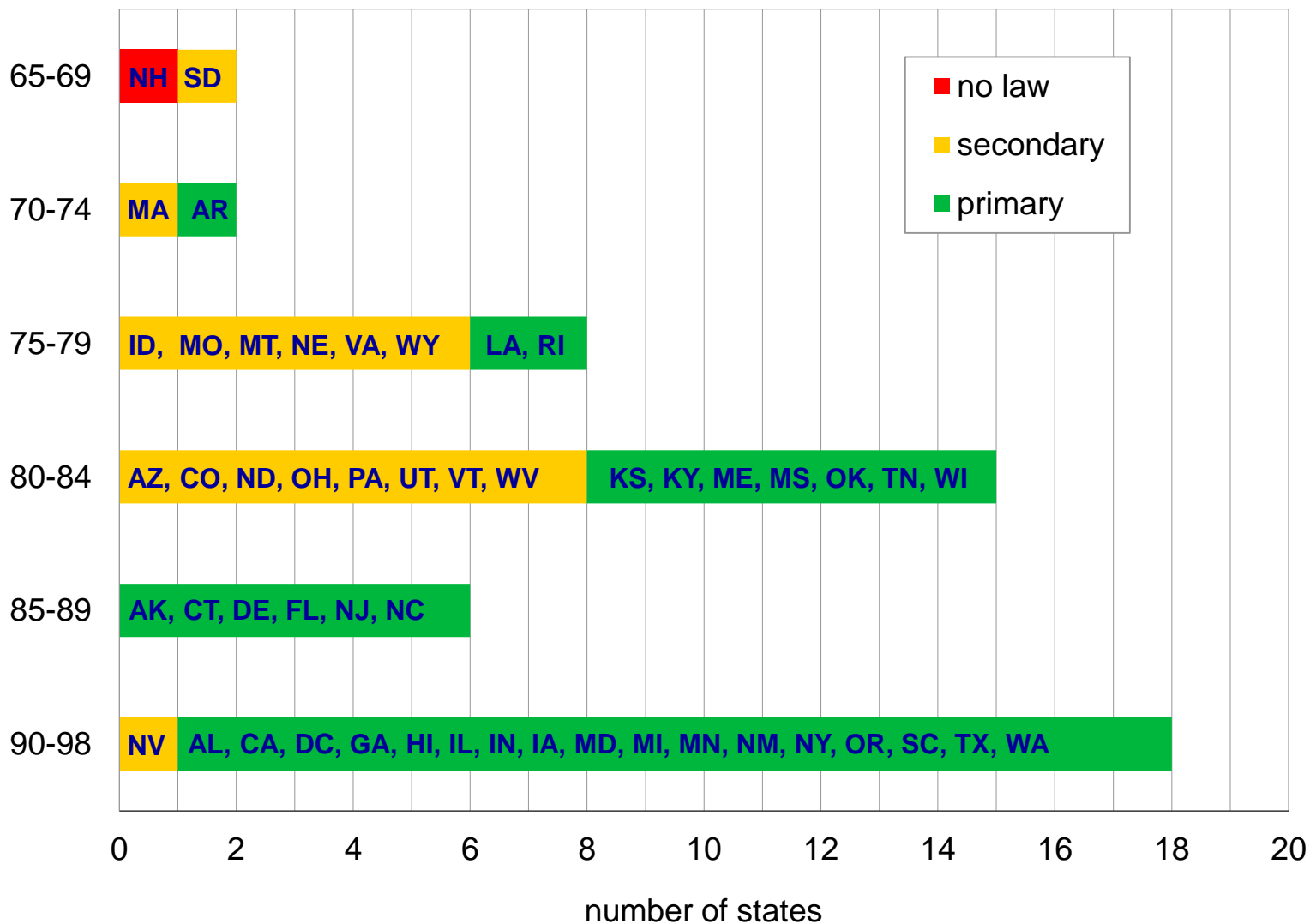
# Primary and secondary belt use laws

January 2014



# Percent belt use reported by states

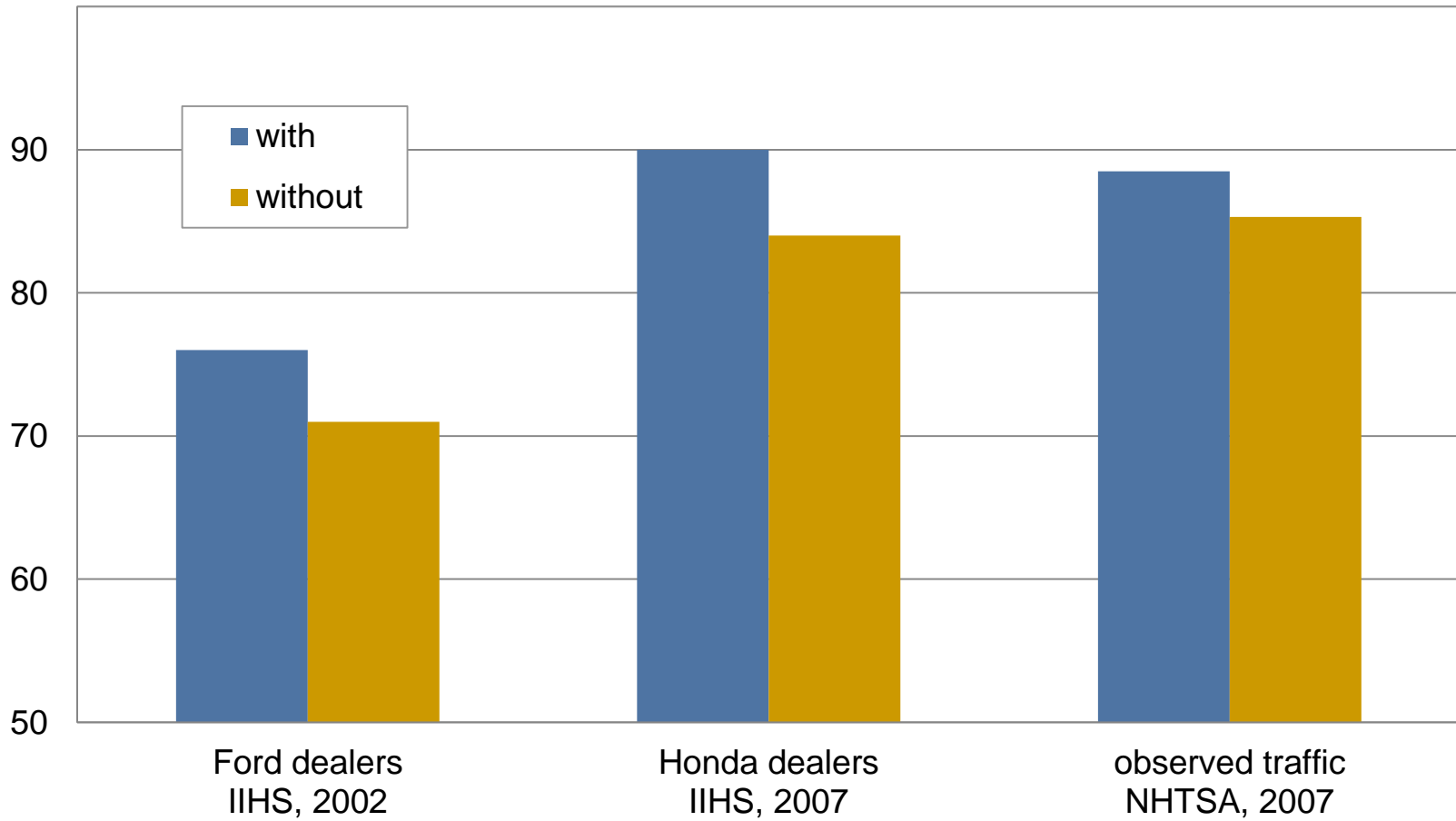
2012



# Primary enforcement seat belt laws raise belt use among teenagers

- Whether crash occurred in state with primary seat belt law was strong predictor of higher belt use among fatally injured 16-19 year old drivers and passengers (McCartt and Northrup, 2004)
- After controlling for driver's age and restraint status and the seating row of the occupant in crashes of insured vehicles, a 13-15 year old was over twice as likely to be unrestrained in a secondary enforcement state as compared to a primary enforcement state (Durbin, Smith, Kallan et al., 2007)

# Percent driver belt use in vehicles with and without enhanced reminders



# Can enhanced reminders be used more effectively to boost safety belt use in the U.S.?

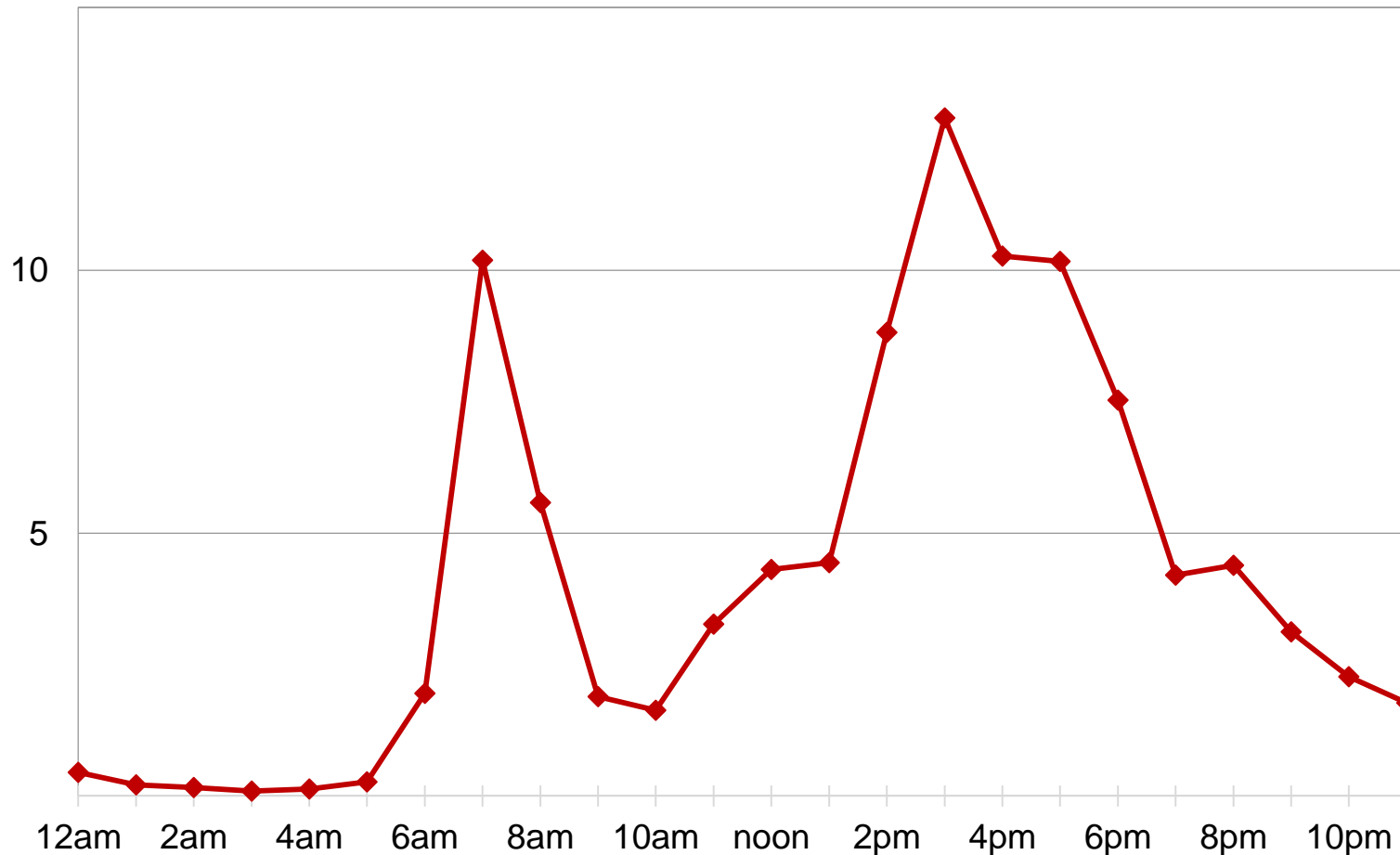
- Enhanced reminders in 2013 models: 90 percent driver, 78 percent front passenger, 3 percent rear passenger
  - About 16 percent of enhanced reminders for front seat meet Australasian and Euro NCAP criteria
- MAP-21 allows federal government to require strong belt reminders
  - Can require chime for more than 4-8 seconds
  - Cannot require ignition interlocks but can allow automakers to use interlock to comply with safety regulation
  - Must begin rulemaking to require seat belt reminders



## Promising strategies directed at teens

# Distribution of 16-17 year old drivers involved in police-reported crashes on weekdays during school year

By time of day, United States, 2009-12



# Will a belt requirement in a high school parking permit program affect belt use?

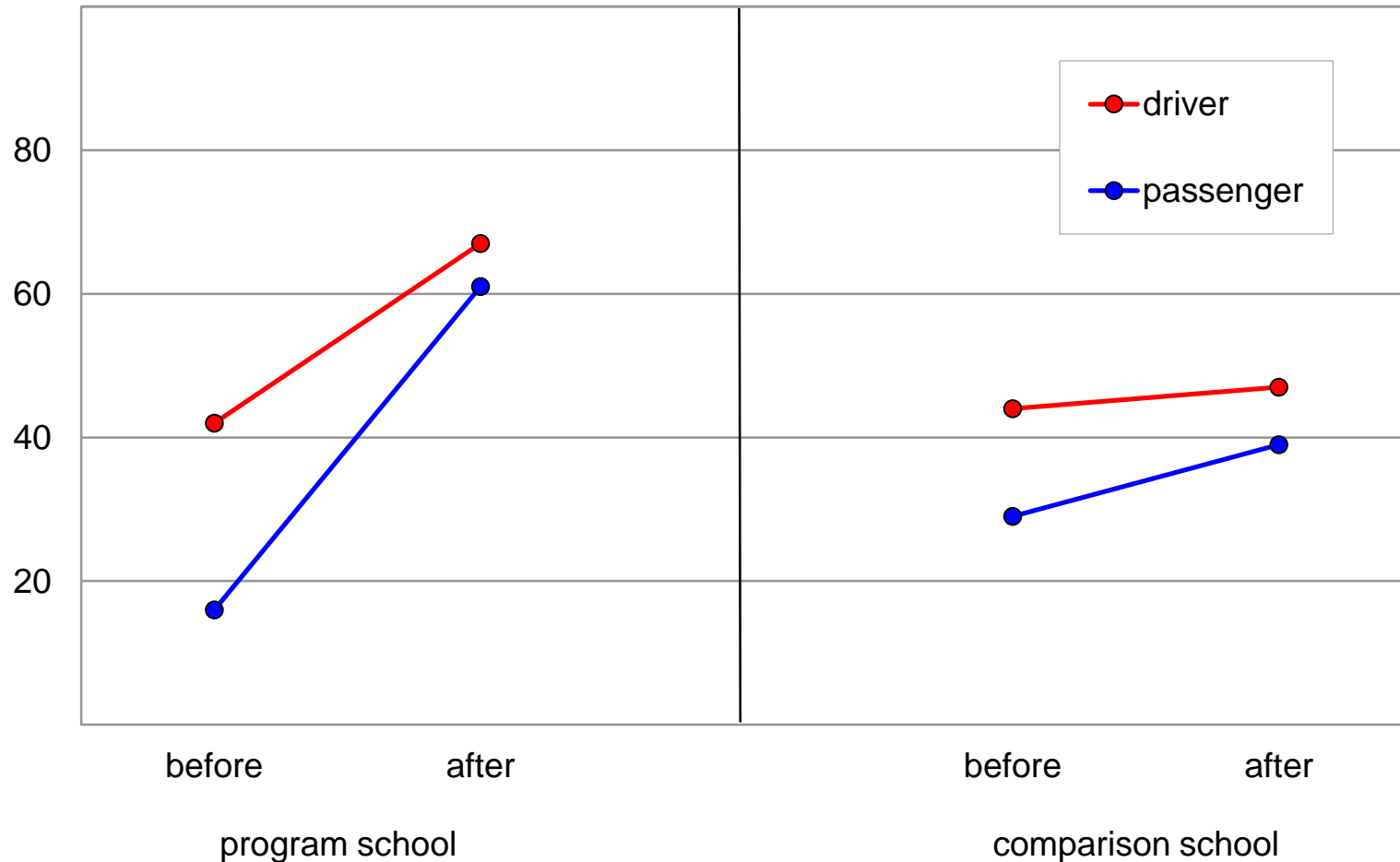
McCartt, Geary, Solomon, 2005

- Belt requirement established by school in Connecticut (primary law state) and school in Mississippi (secondary law state)
- Required student drivers and passengers to buckle up in vehicles with parking decals
- Graduated penalties, culminating in loss of parking privileges
- Belt use observed at program and comparison schools before and 6 months after requirement



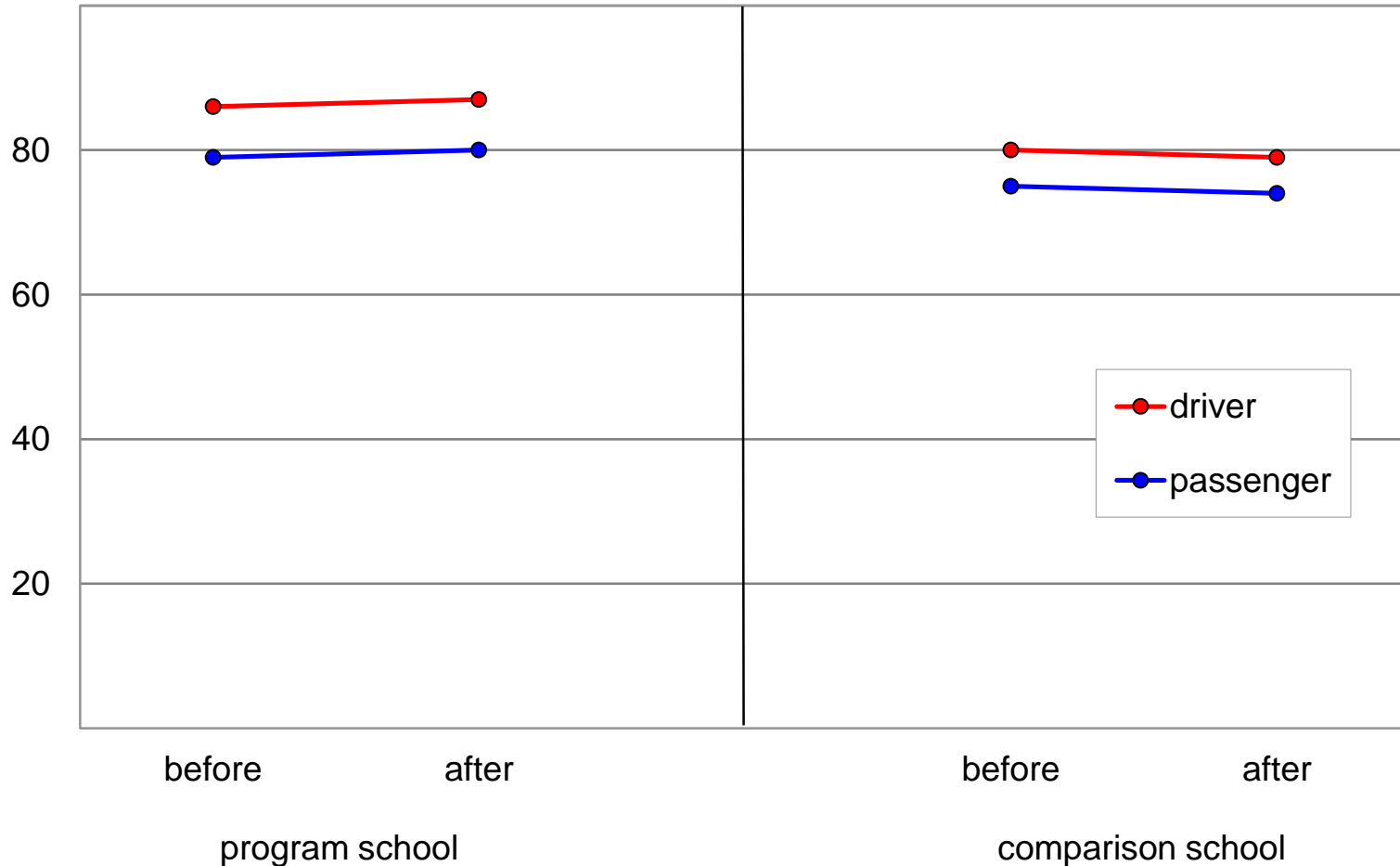
# Percent morning teen belt use before and after belt requirement

Hattiesburg, Mississippi



# Percent morning teen belt use before and after belt requirement

Danbury, Connecticut



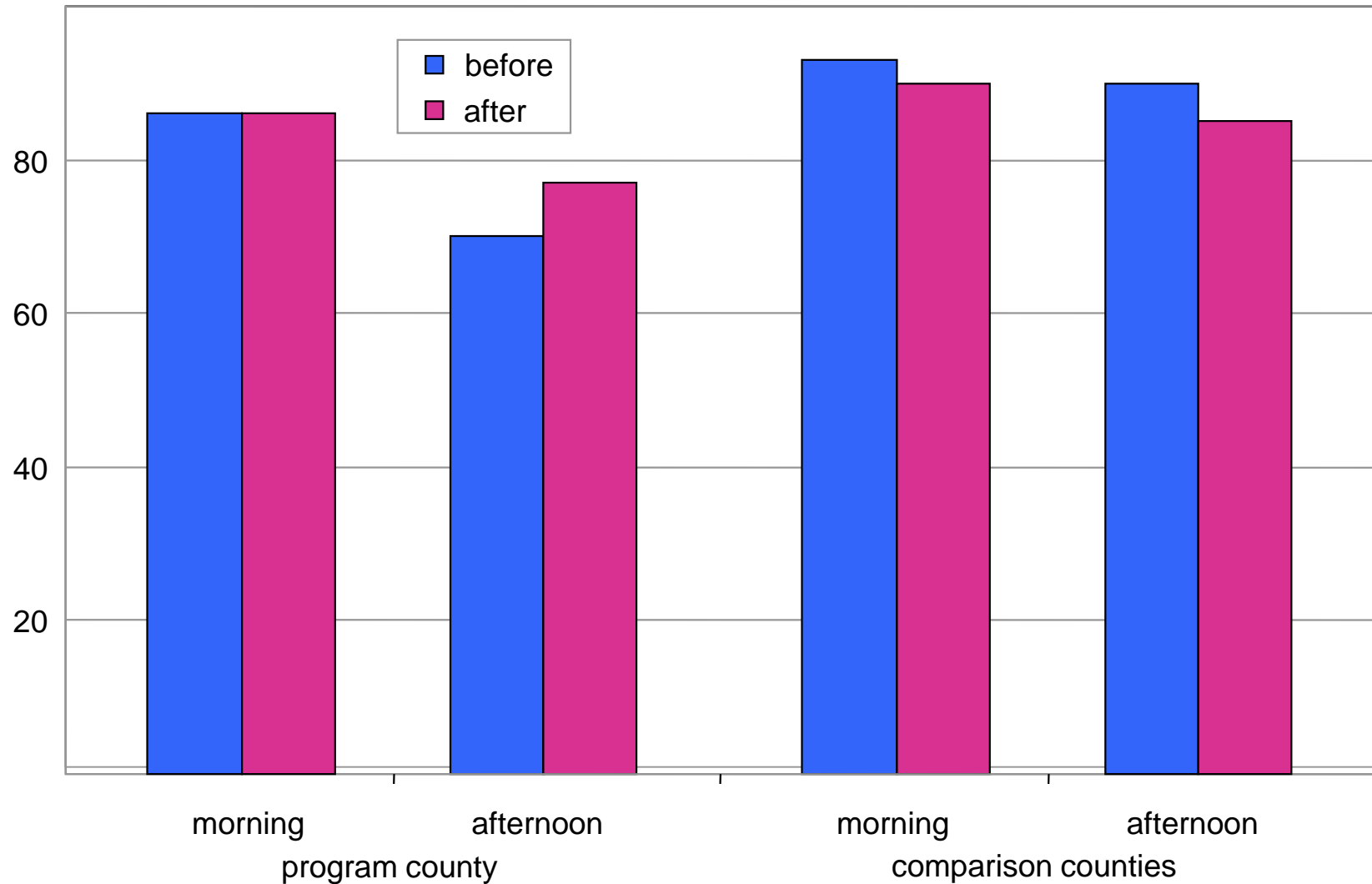
# High visibility enforcement of graduated licensing laws in North Carolina

Goodwin, Wells, Foss, Williams, 2006



# Percent of drivers using seat belts at high schools

Before and after program



# Other promising approaches

- Community programs that combine education, peer-to-peer persuasion, publicized enforcement, and parental monitoring have some potential for increasing teen safety belt use (Fell, Baker, McKnight, et al., 2005)
- A Special Traffic Enforcement Program targeting teenagers in Colorado and Nevada had some success in increasing teen's belt use (Nichols, Haire, Solomon et al., 2011)



## Parental oversight

# What role can parents play?

- Style of parenting can affect teens' belt use; reported belt use higher with authoritative or authoritarian parents (Ginsburg, Durbin, Garcia-Espana, 2009)
- In a randomized study testing the effects of risky driving feedback with teens, feedback combined with parents being informed reduced risky driving, whereas immediate feedback only to teenagers did not (Simons-Morton et al., 2013)

# In-vehicle mentoring devices for teens



- Computer chip
- GPS tracking on cell phone
- Video camera
- Ford MyKey





# Study of in-vehicle feedback and monitoring device

Farmer, Kirley, McCartt, 2010

- Shoebox-size black box in vehicle cargo area, GPS, satellite modem, and small speaker box beneath dashboard
- Recorded location and miles driven
- Detected
  - All sudden braking and all sudden acceleration (longitudinal deceleration/acceleration more than 0.5 g)
  - Driver not using belt
  - Speed 2.5 mph faster than limit
  - Speed more than 10 mph faster than limit

# Study design

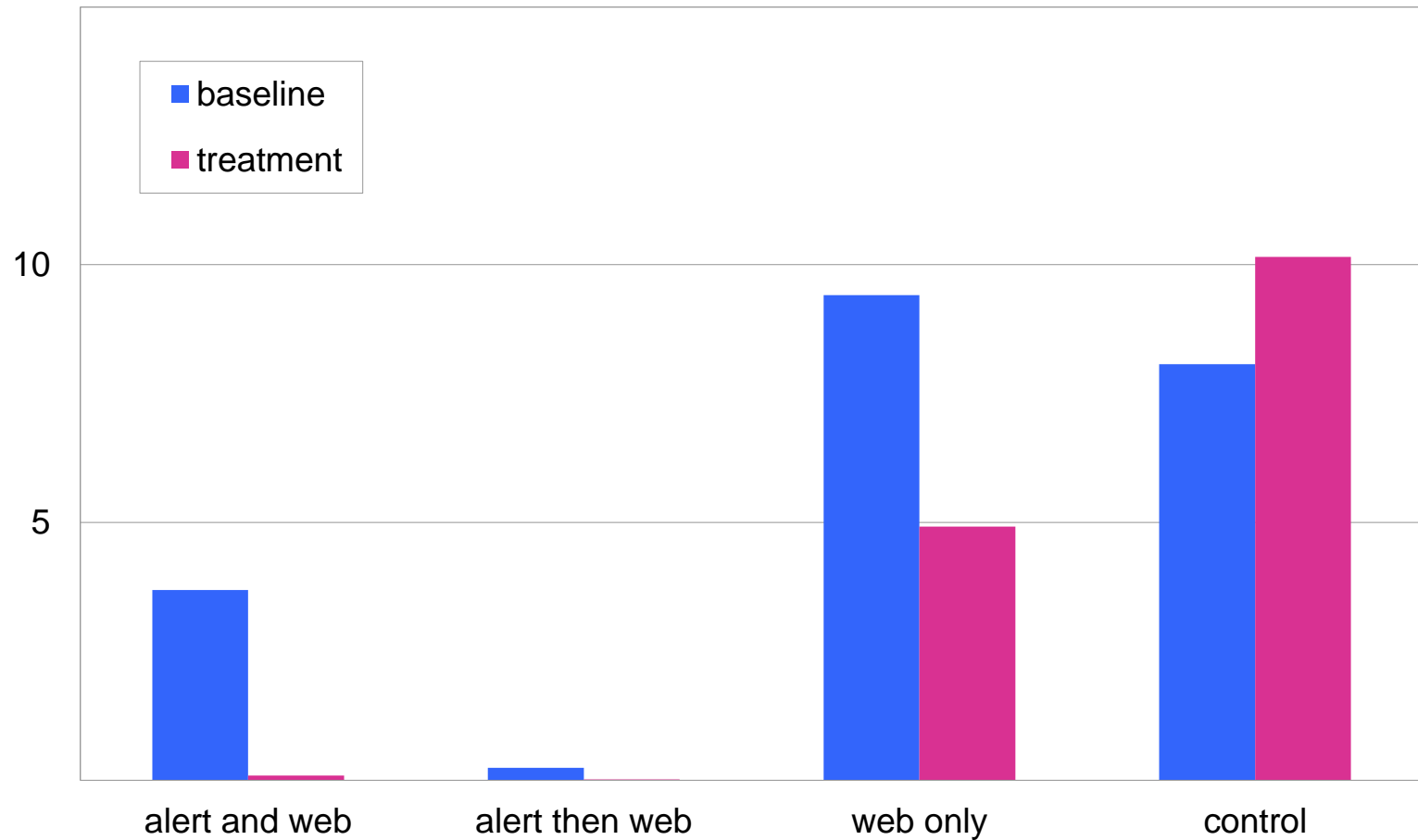
- Random assignment of 85 families to study and control groups
- Vehicle monitoring: 2 weeks baseline, 20 weeks alerts and website, 2 weeks post-treatment
- Before/after changes in driving behavior (per mile driven) in 3 study groups relative to control group
  - Group 1: alerts driver and immediately notifies website
  - Group 2: alerts driver and 20 seconds later notifies website if behavior not corrected
  - Group 3: notifies website but no in-vehicle alert
  - Group 4: control group with monitoring but no alert or notification

# Safety belt alert



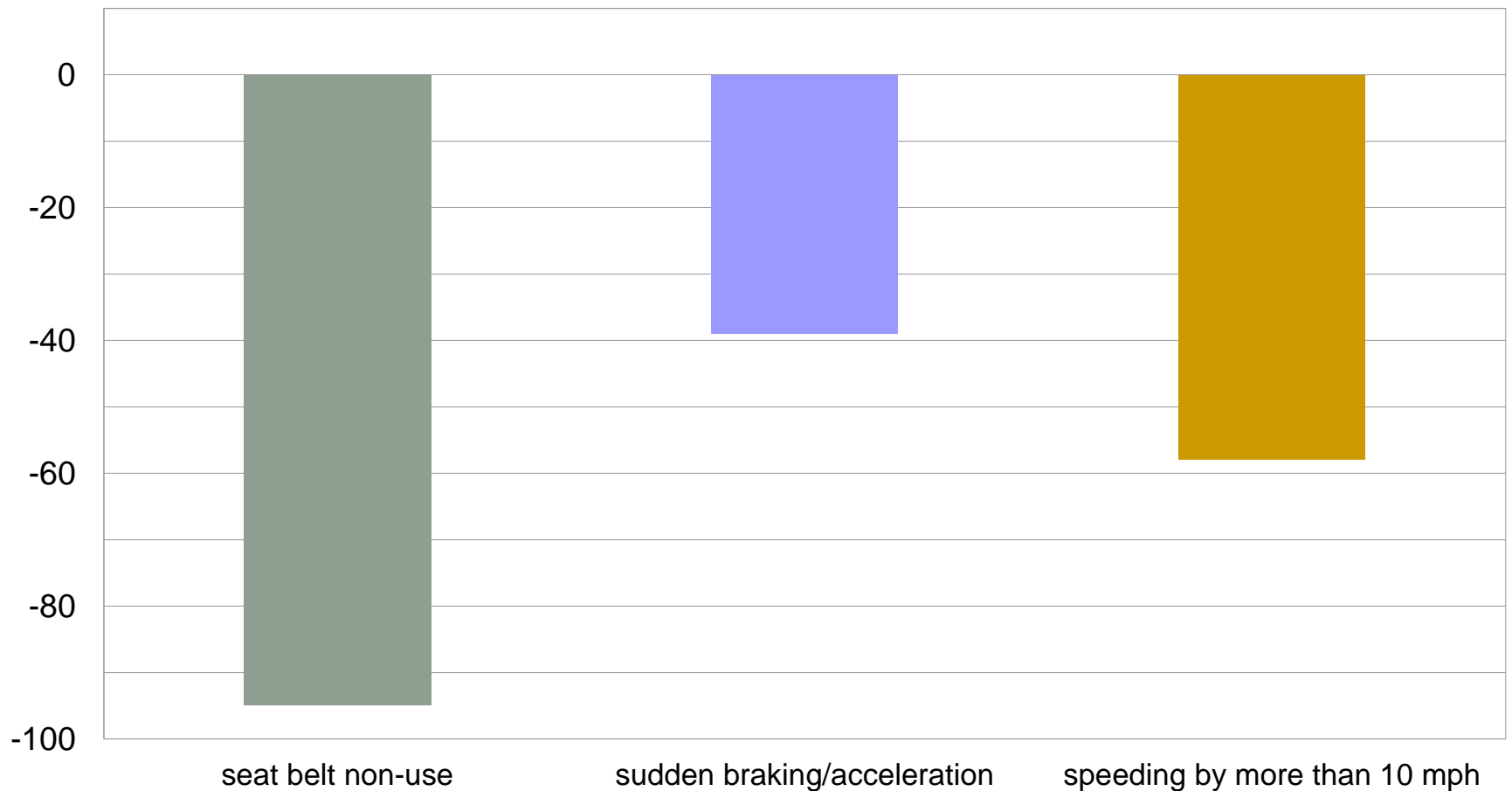
# Percent of miles driven while not using belts

By period and study group



# Percent reduction in risky behaviors with monitoring device

With alert in vehicle, delayed parent notification, parent report card



# Conclusions about in-vehicle monitoring

- Hard sell and unclear how many families will accept
- Alerts improve effectiveness
- Feedback to parents improves effectiveness
  - Web access alone doesn't assure feedback to parents
  - Works best if teenager given chance to correct behavior
- Effects may level off during treatment and fade after removal

# Summary of promising countermeasures to increase teens' belt use

- Strengthening existing seat belt laws
- Enhanced seat belt reminders
- High visibility enforcement of belt laws near schools and other locations where teens congregate
- Strong belt component of GDL law, e.g., extended delay in full licensure for seat belt citation
- Parental oversight mechanisms, including in-vehicle monitoring



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