BY RICHARD A. DERRIG

Are We All Buckled Up Yet?

I'M NOT ONE OF THOSE WHO NEED CONVINCING that wearing a safety belt when driving a car is a good idea. At least, not after the episode of Jan. 11, 2001. That was the day that running an errand to a strip mall to pick up a repaired camera was anything but an ordinary trip.

I found myself somewhere in Warwick, R.I., in one of two small shopping malls that straddle Route 2, a five-lane highway. An unexpected Jeep Cherokee greeted my mid-day slow left turn from the mall with a high-speed smack in the passenger front quarter panel. A 270-degree spin and secondary collisions with two other cars that were stopped at the Route 2 traffic lights occupied the next 10 seconds. Eleven people, including two babies, emerged unharmed from five vehicles to watch the police corral the underage driver of the stolen Jeep.

Our safety belts, and the child restraint systems, worked as advertised.

Safety Belts Usage

Safety belts became mandatory in new cars sold in the United States in 1968. Enough time has passed so that virtually 100 percent of the private passenger cars on the road today have safety belts installed. But are they used?

Observational studies have shown an increase in usage from 11 percent in 1980 to 68 percent in 1995. Curiously, a telephone survey by the National Highway Traffic Safety Administration (NHTSA) in 1998 reports that 91 percent of the drivers buckled up most or all of the time compared with 70 percent in that year's observations. Seems like even some of the all-the-time users (79 percent) are reluctant to admit not wearing safety belts.

The demographics of drivers reporting all-the-time usage are revealing. Females, college educated, and high-wage earners have a healthy 7 percent to 12 percent usage advantage over their male, high school or less, and low-wage-earning brethren. Even more so, if you drive a car (82 percent), have one drink per day (84 percent), or normally drive 55 mph (83 percent), rather than driving a pick-up (65 percent), having seven drinks per day (53 percent), or driving 70+ miles per hour (69 percent).

The NHTSA data above concern on-the-road behavior, either as objectively observed or as subjectively self-reported in the telephone survey. Insurance claim files provide another source for safety belt usage with a mix of objective (police reports) and subjective self-reported (operator reports) data.

The Insurance Research Council (IRC) recently released an analysis of a national sample of 1997 accidents resulting in bodily injury liability (BI) or personal injury protection (PIP) claims. IRC reports markedly increasing rates of safety belt usage from 1987 to 1997 for females (47 percent to 87 percent) and lagging males (38 percent to 80 percent) making BI claims.

The magnitudes involved here suggest somewhat inflated levels of self-reported usage compared with the observational studies. Disability from the claimed BI increases in severity as safety belt usage decreases as no disabilities, temporaries, permanent totals, and fatalities have average usage rates of 91 percent, 86 percent, 76 percent, and 53 percent, respectively.

Safety Belts Save Lives

There haven't been many disputes that safety belt use reduces the mortality of those in severe crashes. There is, however, a wide range of measured effectiveness, from 22 percent to 75 percent mortality reductions in various studies worldwide, with a NHTSA-sponsored average effectiveness of between 40 percent and 50 percent.

As actuaries would notice, these mortality reductions are conditional on being in a severe crash. Occupant fatalities depend not only on safety belt use but on the likelihood of (a) being in a crash, (b) the severity of the crash once the crash happens, and/or (c) the severity of the injury sustained by occupants and (d) timely and appropriate health care for the injured.

The Fatal Accident Reporting System (FARS) data in Figure 1 reveal that front-seat occupant safety belt

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usage in fatal crashes is well below the population observational rates.

Governmental Efforts

Federal and state governments have encouraged safety belt usage through laws, regulations, and publicity-laden initiatives. All are good government attempts to save lives and reduce the medical and auto insurance costs.

NHTSA encouraged, then required under threat of withholding funds, state mandatory seat belt laws in the 1980s. Indeed, Massachusetts passed such a law in 1985; repealed it under a talk show host-led "freedom" banner; passed it again in 1993; and defeated a second repeal referendum a year later. Each passage of the mandatory seat belt law encouraged about a 20 percent increase in observed front-seat occupant usage. No further significant increases have been taken, however, leaving Massachusetts motorists with a bottom-10 usage rate of only 52 percent in 1999. All states except New Hampshire (Motto: Live Free or Die) now have mandatory seat belt laws.

Under a 1996 presidential initiative, NHTSA provides incentive grants to the states to encourage increased seat belt usage. Such grants for 1999-2003 should total about $500 million.

One set of grants will be to encourage the increase in the population usage rates. Figure 2 shows what theory would predict; i.e., high usage rates are a result of strong enforcement of the laws. States with primary enforcement laws (motorists can be stopped solely because of non-use of safety belts or child restraints) generally have higher population usage rates than those with secondary enforcement (motorists can be ticketed for non-use only in connection with another traffic violation).

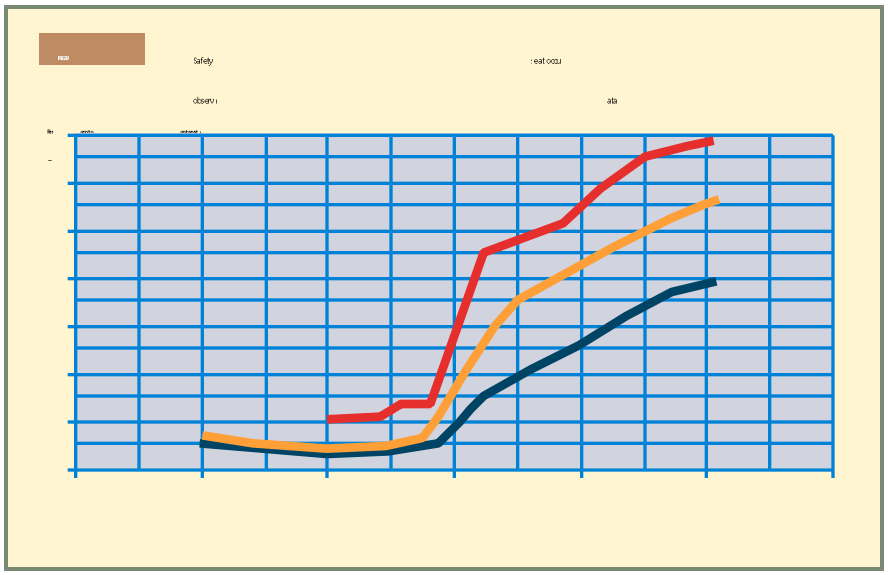
Given the great disparity between usage rates in the population and usage rates in fatal crashes shown in Figure 1, should we be targeting the population usage or the at-risk demographic groups? Recent research shows the latter, rather than the former, should be the public policy priority

Population Usage Rate Study

The emphasis on population safety belt usage rates may stem from the following truism: If 100 percent of the motoring population uses safety belts, then 100 percent of those in fatal accidents will be wearing safety belts (and hence benefit by the injury-mitigating effects).

Unfortunately, the disparity in usage rates shown in Figure 1 is likely to persist at current and realistic levels of increased safety belt use. Realizing that fact prompted us to ask what the historical relationship was between the population usage rate and fatality rates.

Data from FARS were combined with



demographic data to produce two fatality rates (per vehicle miles traveled and per population) for regression analysis. Since fatalities and fatality rates have been decreasing during the past 20 years or so, the use of increasing population seat belt usage rates as in Figure 1 in a simple univariate analysis is sure to produce a negative correlation. But that may be spurious.

Data series were constructed that allowed testing of the relationship between fatality rates and population safety belt usage rates by state, in the presence of other explanatory variables such as alcohol use, education levels, gender, and hospital availability, among others. Panel data methods were applied to the 700 state-year data points from 1982-1996 to test for statistically significant fatality rate reductions associated with unit increases in population safety belt usage rates for occupants of cars and vans.

The effectiveness of primary versus secondary enforcement laws also was tested with a primary seat belt (SB) law dummy variable representing about 20 percent of the available state-years. The results are summarized in Figure 3.

The multivariate analysis shows little or no fatality-rate reducing effect associated with population seat belt usage rates. The primary enforcement law appears to have a fatality-rate reducing effect but fails to reach statistical significance.

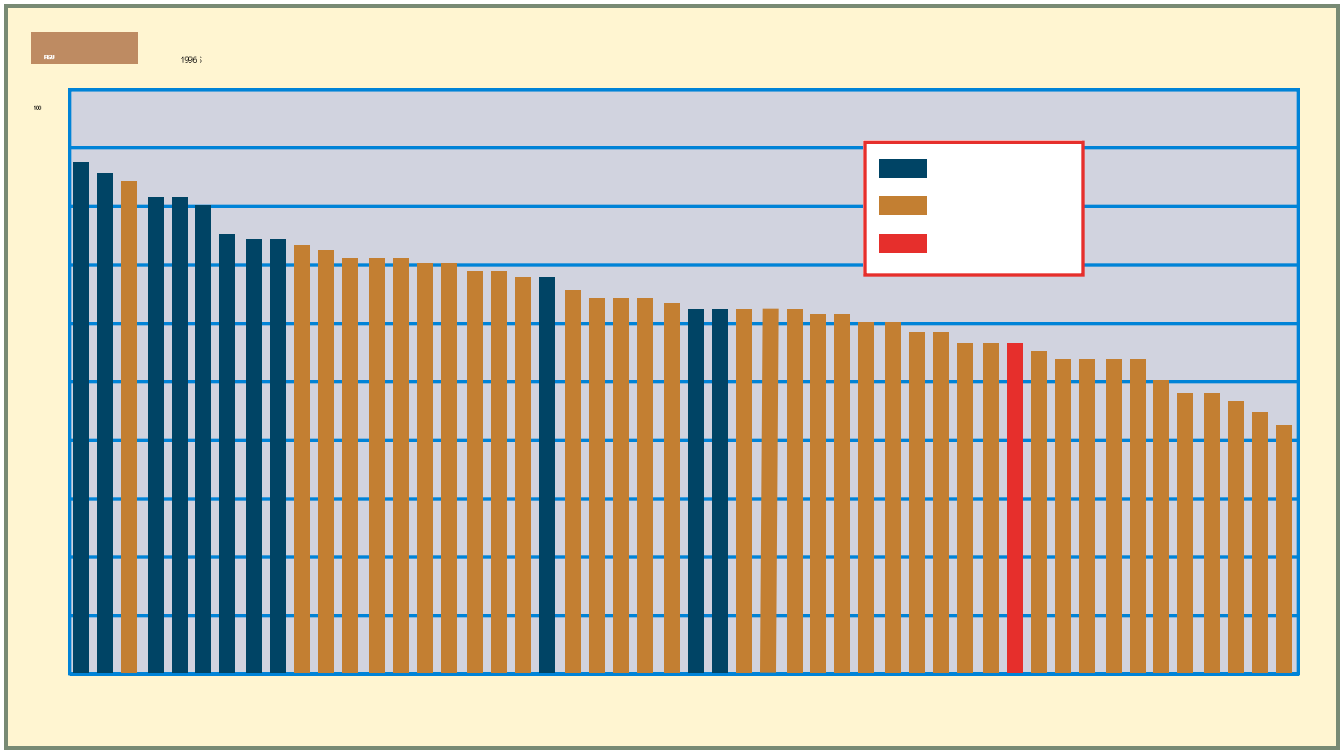
Figure 4 displays the results for the demographic data. Hospital availability and medical treatment quality (as indicated by price), together with educational levels, show a significant salutary effect on fatality rates. Alcohol consumption, proportions of youthful and elderly operators, and percentages of rural roads are all significantly positively correlated with fatality rates.

Bad weather, as proxied by annual precipitation levels, appears to have a significant dampening effect on the fatality rates. Perhaps people drive more carefully or not at all in bad weather conditions.

Other variables show mixed or non-significant results across the six fixed effects regression models tested.

Policy Implications

The recent increase in safety belt usage rates may not be primarily responsible for the observed decrease in road fatalities. The population safety belt usage increase may be due to risk-averse drivers and



their occupants (who were very unlikely to be in a crash to begin with) while risky drivers maintained their belting behavior.

NHTSA should target its efforts to increase safety belt use among risky subpopulations. NHTSA should use whichever incentives work for that goal rather than reward a statewide population increase in safety belt rates. Increased safety belt use by the risky driver subpopulation should have the desired effect of decreased fatalities.

Primary law enforcement, while generally not significantly associated overall with fatality rate reduction, remains a principal legal step in persuading drivers to use safety belts. In addition, this analysis reinforces the primary roles of alcohol consumption, education levels, and medical facilities in the determination of fatality rates.

The results also provide some empirical rationale (as if it were needed) for negative programs such as a reduced blood-alcohol content level for DWI convictions, and positive programs such as prom night alcohol-free incentives or the staffing of EMT response teams and trauma centers.

Remember, safety belts and child restraints save lives. Do buckle up so that 100 percent of the actuaries can be observed wearing their seat belts! ●

FIGURE 3 Selected panel data results. SB coefficient ranges on fatality rates

	POPULATION SEAT BELT USE	PRIMARY SEAT BELT LAW
Deaths per pop.	–0.007 to –0.6	–2.9 to –3.4
Deaths per VMT	0.13 to 0.25*	–4.9 to –5.1

*P<0.05

Source: Three different models were evaluated where the insurance covariate was differently specified as either % uninsured; insurance type dummy; or insurance instrumental.

FIGURE 4 Demographic variables, direction of effect and significance

- Alcohol consumption +
- Percent
  - Younger +
  - Older +
- Education –
- Income +
- Population living in metropolitan areas +/–
- Percent rural interstate roads –
- Precipitation –
- Insurance
  - Uninsured +/–
  - Tort/Non-fault +/–
- Traffic density –/–
- Hospital density –
- Hospital level –

P<0.05. Overall R^2 84%–92%

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