

# Trends in Safety Belt Use by Demographics and by Type of State Safety Belt Law, 1987 through 1993

## ABSTRACT

**Objectives.** This study examined trends in safety belt use by age, sex, race/ethnicity, education, and type of safety belt law.

**Methods.** We analyzed Behavioral Risk Factor Surveillance System data on safety belt use from 33 states for 1987 through 1993 and used linear regression models to determine trends in prevalence.

**Results.** Asian/Pacific Islanders and Hispanics had the highest safety belt use among racial/ethnic groups. Prevalence varied little from age 25 through 64 years in all years, but averaged 25 percentage points higher in states with primary laws than in states with no belt laws. Overall safety belt use increased by an average of  $2.7 \pm 0.1$  percentage points per year and varied little across most demographic groups, but there was no significant increase for Black males aged 18 through 29 years.

**Conclusions.** The generally consistent increase in safety belt use across demographic groups is in sharp contrast to trends in other health-risk behaviors. States should enact primary safety belt laws and focus safety belt use efforts towards young Black males. (*Am J Public Health*. 1998;88:245-249)

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### Introduction

Motor vehicle injuries are the leading cause of death among persons aged 1 through 34 years.<sup>1</sup> Proper use of safety belts reduces the risk of a fatal motor vehicle injury by 45% and moderate to critical injuries by 50%, making safety belt use an important factor for preventing or reducing the severity of motor vehicle injuries.<sup>2,3</sup>

Observational surveys demonstrate that safety belt use increased nationally from 42% in 1988 to 67% in 1994.<sup>4,5</sup> It is not known if this increase has been consistent across different levels of age, sex, race, education, or type of safety belt law. This information would be useful for monitoring safety belt use in known high-risk populations,<sup>6-13</sup> to help identify new populations that are at risk for nonuse of safety belts, indirectly measure the effects of past efforts to increase safety belt use, and effectively target efforts to increase usage.

No studies have examined trends in self-reported adult safety belt use by demographic characteristics. We analyzed survey data from 33 states participating in the Behavioral Risk Factor Surveillance System (BRFSS) from 1987 through 1993 to determine whether there were differences in trends of self-reported safety belt use by age, sex, race/ethnicity, or education and to determine if changes in self-reported safety belt use varied by the type of state safety belt law and by when such laws were enacted.

### Methods

The 33 states participating in the BRFSS from 1987 through 1993 (for this study, "state" includes the District of Columbia) were Alabama, Arizona, California, District of Columbia, Florida, Georgia, Hawaii, Idaho, Illinois, Indiana, Kentucky,

Maine, Maryland, Massachusetts, Minnesota, Missouri, Montana, Nebraska, New Hampshire, New Mexico, New York, North Carolina, North Dakota, Ohio, Rhode Island, South Carolina, South Dakota, Tennessee, Texas, Utah, Washington, West Virginia, and Wisconsin. These states contained 73.7% of the US population.<sup>14</sup>

Details of the BRFSS have been described elsewhere.<sup>15,16</sup> To put it briefly, state health departments conduct monthly telephone surveys of randomly selected adults aged 18 years and older. Respondents are randomly selected by means of a multistage cluster design. During the 8-year period, the median sample size among the 33 states increased from 1337 in 1987 to 2056 in 1993, and the median response rate (based on methodology recommended by the Council of the American Survey Research Organization<sup>17</sup>) increased from 64% to 71%. State response rates ranged from 43% to 85% in 1987, 49% to 96% in 1988, 47% to 98% in 1989, 54% to 93% in 1990, 38% to 83% in 1991, 57% to 92% in 1992, and 54% to 91% in 1993.

For all years, respondents were asked: "How often do you use seat belts when you drive or ride in a car?" Possible responses, which were read to respondents, included always, nearly always, sometimes, seldom, or never. Only persons who reported that

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they always use seat belts were classified as safety belt users.

Demographic characteristics of participants were determined according to their responses to questions about age, sex, race, ethnicity, and education level. For our analyses, we categorized age groups as 18 through 24, 25 through 29, 30 through 34, 35 through 44, 45 through 64, and 65 years or older; race/ethnicity as White, Black, Hispanic, Asian/Pacific Islander, or American Indian/Alaskan Native; and education level as less than high school, high school graduate, some college or technical school, or college graduate. On the basis of preliminary results, we conducted additional analyses for persons aged 18 through 29 and 30 and older stratified by race and sex. We obtained data from the National Highway Traffic Safety Administration on state safety belt laws and type of law—primary, secondary, or none.<sup>18</sup> (Primary law dictates that persons can be cited solely for failure to use safety belts; secondary law dictates that persons can only be cited for non-use of safety belts if another moving violation has occurred.) State safety belt laws were categorized as a primary law in place from 1987 through 1993, a secondary law in place from 1987 through 1993, a secondary law enacted from January 1987 through June 1990, a secondary law enacted from July 1990 through June 1993, or no safety belt law. West Virginia was considered a no-law state because its law was not in effect until September 1993.

Estimates were weighted to reflect the age, race, and sex distribution within each state, and we excluded persons who never drove or rode in automobiles and persons with unknown or missing data on safety belt use, age, sex, race, ethnicity, or education level from all analyses. Data were pooled for each year. SUDAAN was used to calculate standard errors and 95% confidence intervals.<sup>19</sup>

Preliminary scatter plots suggested a linear relationship between prevalence and year for demographic characteristics, so we created weighted least squares linear regression models (using the inverse of the variance estimates for weights) to identify overall state trends in safety belt use, as well as separate models to examine trends by demographics. Separate models were then created to determine trends among combined sex and race/ethnicity groups (e.g., Black males, White females) for persons 18 through 29 and for persons 30 and older, as the risk of motor vehicle injury is much higher among younger persons.<sup>1</sup> Because of sample size considerations, the combined sex and race/ethnicity models excluded American

**TABLE 1—Characteristics of Study Population and Average Annual Increase in Prevalence of Safety Belt Use Based on Linear Models, 1987 through 1993**

Characteristic	Range of Annual Number of Respondents, %	Annual Percentage-Point Increase 95% CI <sup>a</sup>	R <sup>2</sup> for Model <sup>*</sup>
Age			
18–24	5559–6938 (9.9–11.3)	2.7 ± 0.4	0.98
25–29	5877–6973 (10.1–11.9)	2.3 ± 0.5	0.97
30–34	6123–8238 (11.9–12.8)	2.3 ± 0.7	0.94
35–44	9925–22 071 (20.1–22.5)	2.7 ± 0.4	0.99
45–64	12 297–18 103 (24.8–26.1)	2.8 ± 0.2	1.00
65+	9479–13 537 (18.7–19.5)	3.1 ± 0.3	0.99
Sex			
Male	20 675–29 197 (41.9–42.7)	2.6 ± 0.3	0.99
Female	28 595–40 068 (57.3–58.1)	2.9 ± 0.2	1.00
Race/Ethnicity			
White	41 868–56 382 (81.4–85.0)	2.8 ± 0.1	0.99
Black	3738–6442 (7.6–9.3)	2.4 ± 1.1	0.88
Hispanic	1981–3848 (4.0–5.7)	2.9 ± 0.9	0.93
Asian/Pacific Islander	1378–2020 (2.7–2.9)	1.7 ± 1.3	0.69
American Indian/Alaskan Native	284–573 (0.6–0.8)	3.4 ± 1.3	0.90
Education level			
Less than high school	9245–10 549 (15.2–18.8)	2.9 ± 0.5	0.98
High school graduate	16 908–23 002 (33.2–34.3)	2.8 ± 0.2	1.00
Some college or technical school	12 298–18 622 (25.0–26.9)	2.6 ± 0.2	0.99
College graduate	10 797–17 092 (21.9–24.7)	2.2 ± 0.3	0.98
Total	49 260–69 265	2.7 ± 0.1	0.99

Note. CI = confidence interval.

<sup>a</sup>Based on weighted least squares linear models.

<sup>\*</sup>P < .01 for all models.

Indians. Finally, for trends by type of safety belt law, linear models were used for states with primary laws, secondary laws, or no laws throughout the study period; for states that enacted secondary laws from 1987 through 1993, separate linear models were used to describe trends before and after safety belt laws were enacted. The fit and significance of all models were based on R<sup>2</sup> coefficients and P values.

## Results

The overall number of respondents per year for the 33 states ranged from 49 260 to 69 265 (Table 1). Except for American Indians, there were more than 1000 respondents within each group in all years. The overall prevalence of self-reported safety belt use increased from 51.5% in 1987 to 67.9% in 1993 (data not shown in tables); this was an average annual increase of 2.7 ± 0.1 percentage point (Table 1).

Self-reported safety belt use was highest among persons aged 65 years and older and lowest among persons aged 18 through 24 years, but varied little among persons aged 25 through 64 years (data not shown).

In all years, self-reported safety belt use was higher among women than men, Asian/Pacific Islanders and Hispanics compared with other race/ethnicity groups, and college-educated persons compared with persons with less than a college education (data not shown). Average annual increases in self-reported safety belt use varied little by age, sex, or education; although there was greater variation by race/ethnicity, the racial/ethnic groups were not significantly different from each other in their increases in seat belt use (Table 1).

For both males and females aged 18 through 29 years, the prevalence of self-reported safety belt use was highest among Asian/Pacific Islanders and Hispanics and lowest among Whites and Blacks (Table 2). Comparable increases in prevalence occurred among all groups except for Black males and Asian/Pacific Islander males and females (Table 2). (Asian/Pacific Islander sample sizes were relatively small.)

As with younger adults, self-reported safety belt use among persons aged 30 and older was highest among Asian/Pacific Islander and Hispanic males (Figure 1; r<sup>2</sup> values ranged from 0.60 through 0.99; P < .05 for all comparisons). Average

annual increases were similar across all groups, ranging from  $2.4 \pm 0.2$  through  $3.3 \pm 1.5$  percentage points. Older Asian/Pacific Islander and Hispanic females had the highest level of self-reported safety belt use (Figure 2;  $r^2$  values ranged from 0.75 through 0.99;  $P < .05$  for all comparisons), but increases over the study period were similar across all female groups (range:  $1.7 \pm 1.1$  through  $2.9 \pm 0.3$  percentage points annually).

Self-reported safety belt use varied by presence and type of safety belt law, with prevalence highest in states that had primary laws, slightly lower in states that had secondary laws, and lowest in states with no laws (Figure 3). In states with no safety belt laws or with primary or secondary laws during the entire study period, average annual increases in self-reported safety belt use were similar (range:  $2.0 \pm 0.6$  to  $2.7 \pm 0.3$  percentage points). Self-reported safety belt use increased substantially in states that enacted secondary laws from January 1987 through June 1990, averaging  $7.3 \pm 4.1$  percentage points annually from 1987 through 1990, but only  $1.3 \pm 1.2$  percentage points annually from 1990 through 1993. The opposite pattern was evident for states that enacted secondary safety belt laws from July 1990 through June 1993, with no change from 1987 through 1990 followed by large increases from 1990 through 1993.

## Discussion

Our study confirms earlier research findings by demonstrating that use of safety belts remains less common among young adults, males, Blacks, and persons with lower levels of education.<sup>9-13</sup> Our results extend previous findings by showing that there are additional differences in safety belt use by race/ethnicity beyond Black-White differences, as Asian/Pacific Islanders and Hispanics had the highest prevalences of self-reported safety belt use. Our data also suggest that self-reported safety belt use varies little among persons aged 25 through 64 years. We confirmed previous work showing that the presence of safety belt laws substantially increases safety belt use and that use is higher in states with primary, rather than with secondary, safety belt laws.<sup>6,7</sup>

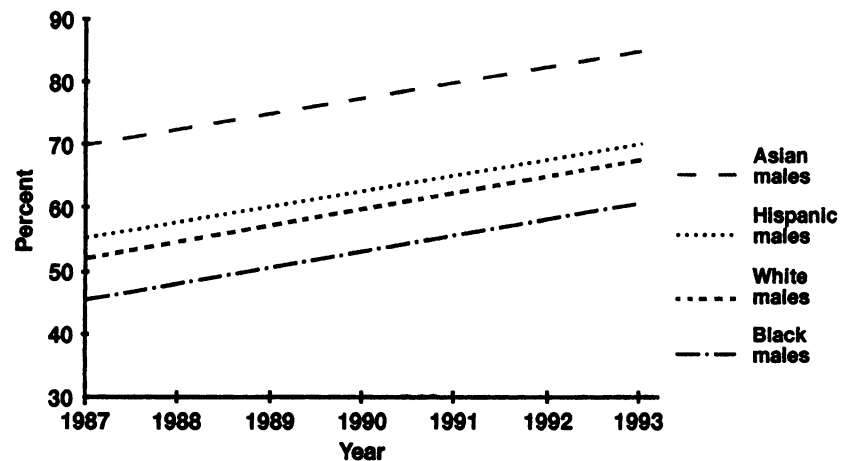
Somewhat surprisingly, we found that the increase in self-reported safety belt use was similar for most demographic groups. These generally consistent increases across subpopulations are in sharp contrast to trends in other health risk behaviors, such

**TABLE 2—Trends in Safety Belt Use among Persons Aged 18 through 29 Years, by Sex and Race, 1987 through 1993**

	1993 Prevalence, % 95% CI	Annual Percentage- Point Increase 95% CI <sup>a</sup>	R <sup>2</sup> for Model	P
White males	54.3 ± 2.3	2.4 ± 0.6	0.96	<.001
Black males	44.1 ± 5.5	0.5 ± 2.0	0.08	.540
Hispanic males	65.4 ± 6.2	3.7 ± 1.2	0.92	<.001
Asian/Pacific Islander males	65.2 ± 9.8	-1.2 ± 2.3	0.24	.260
White females	70.1 ± 1.8	2.9 ± 0.5	0.97	<.001
Black females	58.7 ± 4.7	2.1 ± 1.5	0.71	.020
Hispanic females	72.5 ± 5.0	3.1 ± 2.0	0.75	.012
Asian/Pacific Islander females	77.0 ± 9.5	4.1 ± 4.2	0.56	.054

Note. CI = confidence interval. Sample size ranges: White males (4137-4806), Black males (433-616), Hispanic males (303-556), Asian/Pacific Islander males (152-250), White females (5111-5648), Black females (669-991), Hispanic females (354-657), Asian/Pacific Islander females (158-297).

<sup>a</sup>Based on weighted least squares linear models.



**FIGURE 1—Trends in safety belt use among males aged 30 years and older, 1987 through 1993.**

as cigarette smoking and obesity, in which there are demographic differences in prevalence changes over time.<sup>20,21</sup> It is encouraging that the general trend of increased self-reported safety belt use among younger adults parallels that of older persons, indicating that this is not an age-cohort effect. The most discouraging finding was the lack of increase in self-reported safety belt use among Black males aged 18 through 29 years. Reasons for this are unknown, but may reflect broader patterns of high-risk behavior for younger Blacks.<sup>22</sup> Efforts to increase safety belt use especially need to be targeted towards this population.

Reasons for the overall increasing trend in safety belt use probably include publicity and enforcement of safety belt

laws,<sup>7</sup> increased number of vehicles with automatic safety belts (this may disproportionately affect persons with lower incomes who cannot afford newer vehicles so equipped), mass media campaigns, increased consumer interest in motor vehicle safety equipment such as airbags, and modeling of belt use behavior by parents and other adults for infants and young children (e.g., use of child safety seats may motivate adults to use safety belts).

As expected, self-reported safety belt use increased substantially in states that enacted safety belt laws during the study period. However, increases in self-reported safety belt use were similar for respondents without such laws throughout the study period. This suggests that there has been

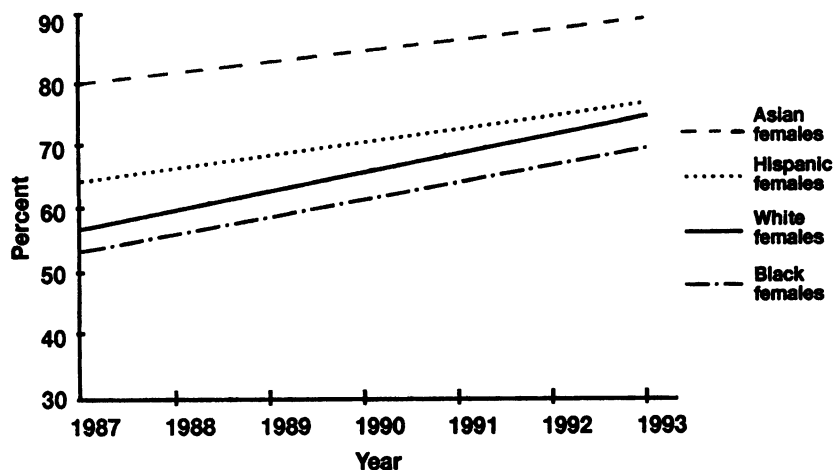
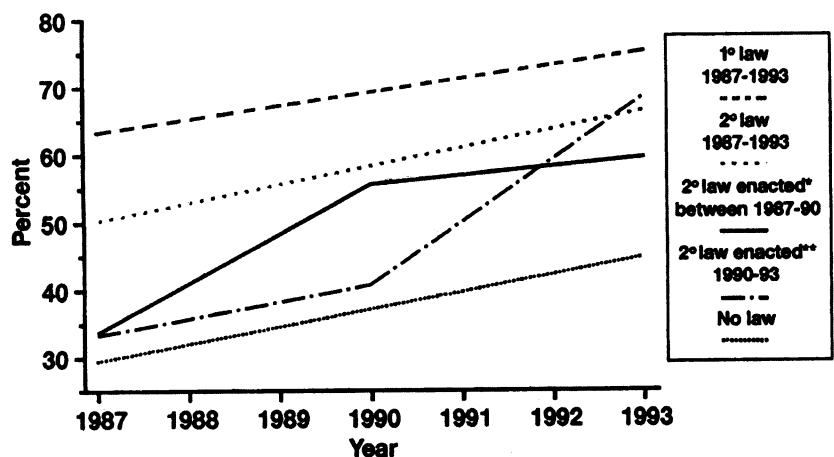


FIGURE 2— Trends in safety belt use among females aged 30 years and older, 1987 through 1993.



\* Enacted by June 1990.  
 \*\* Enacted from July 1990–June 1993

FIGURE 3— Trends in safety belt use by type of safety belt law, 1987 through 1993.

some spillover effect in states without safety belt laws. It is also possible that people from states with safety belt laws moved to states without such laws. It should be noted, however, that safety belt prevalence was about 25 percentage points higher in states with primary laws than in states with no safety belt laws during the study period.

There were study limitations. Survey response rates increased during the study period. The effect that this had on our findings is unclear. However, based on other research, survey nonrespondents often have higher prevalences of health-risk behav-

iors,<sup>23</sup> so this may have slightly increased the number of persons during the study period who were likely to be nonusers of safety belts.

Because our estimates were based on self-reports, they may overestimate actual use,<sup>24,25</sup> with social desirability the most likely reason for overreporting.<sup>13,24</sup> A recent study, however, demonstrated that when safety belt use was defined as “always use,” self-reported 1993 BRFSS state estimates overestimated observed belt use by an average of only 2%,<sup>25</sup> suggesting that the validity of self-reported safety belt use has improved

substantially since the 1980s.<sup>24,26,27</sup> Even if self-reports do overestimate actual use, they can provide valid estimates of underlying trends, as the same question about belt use was consistently asked over time.

Data were obtained only from households with telephones; however, in 1990, 95% of all households in the United States had telephones.<sup>28</sup> Lack of telephone coverage may be a greater problem in certain population groups such as American Indians, where telephone coverage may be substantially lower.<sup>29</sup> Data were obtained from 33 states and may not be nationally representative. However, prevalence of safety belt use in our study was comparable to that reported in 1994 national observation surveys.<sup>5,30,31</sup> Despite the overall large sample size, there were relatively few Asian/Pacific Islander respondents aged 18 through 29 years, making estimates for this group less precise.

There were several strengths of the BRFSS as well. We believe this is the largest data set available for examining safety belt use patterns in the United States. In contrast to many state estimates from observational studies,<sup>25</sup> all BRFSS data are based on random samples and are representative of states’ adult populations.<sup>15,16</sup>

Nationally, safety belt use prevalence was only 15% in 1983,<sup>32</sup> making the large recent increase in safety belt use one of the major public health success stories of the late 20th century in this country. Strong efforts to increase the use of safety belts are warranted because safety belt use is the single most effective way to reduce motor vehicle injuries or fatalities.<sup>2,7</sup> Such efforts include school-based education, mass media campaigns, counseling by health providers, enactment of safety belt laws, and enforcement of safety belt laws. Safety belt laws have played a critical role, and the increase in safety belt use in the United States is strongly associated with the enactment of these laws. Fortunately, as of January 1995, all but two states had safety belt laws in effect.<sup>7</sup>

The results of our study, along with those of previous researchers, demonstrate that efforts to increase safety belt use need to be targeted towards males, Blacks, rural residents, older adolescents and young adults (especially Black males), and persons with lower education levels.<sup>9-13,33</sup> Because primary safety belt laws are associated with higher use rates, states should be encouraged to enact such laws.<sup>6,7</sup> Finally, as demonstrated by the passage of legislation to rescind the 55-miles-per-hour federal speed limit,<sup>34</sup> public health workers cannot assume that state safety belt laws will not be

challenged, and they must be prepared to advocate strongly for the continuance of these laws and for their enforcement. □

## Acknowledgment

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