

ORIGINAL ARTICLE

Seat belt use among Hispanic ethnic subgroups of national origin

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Objective: Findings from over a dozen studies of Hispanic/white disparities in seat belt use have been inconsistent, variably revealing that seat belt use prevalence among Hispanics is higher, lower, or comparable to use among non-Hispanics. In contrast to previous studies, this study investigates disparities in seat belt use by Hispanic subgroups of national origin.

Methods: Data from the US Fatality Analysis Reporting System were used to compare seat belt use among 60 758 non-Hispanic whites and 6879 Hispanics (Mexican American (MA), n = 5175; Central American/South American (CASA), n = 876; Puerto Rican (PR), n = 412; Cuban (CU), n = 416) killed in crashes from 1999–2003. Logistic regression was used to adjust for age, gender, seat belt law, seat position, urban/rural region, and income.

Results: Overall adjusted odds ratios for seat belt use among Hispanic subgroups, relative to non-Hispanic whites, were 1.04 (95% confidence interval (CI) 0.85 to 1.28) for CUs, 1.17 (95% CI 0.95 to 1.44) for PRs, 1.33 (95% CI 1.25 to 1.42) for MAs, and 1.66 (95% CI 1.44 to 1.91) for CASAs. Relative to their non-Hispanic white counterparts, odds ratios among MA and CASA Hispanics were highest for men, younger age groups, drivers, primary law states, rural areas, and lower income quartiles.

Conclusion: Among all Hispanic subgroups, seat belt use was at least as prevalent as among non-Hispanic whites. In the CASA and MA subgroups, which have the most rapidly growing subpopulations of immigrants, seat belt use was significantly more common than among whites.

Motor vehicle crashes cause over 40 000 fatalities annually in the United States.¹ Because seat belts can reduce crash fatality risk by up to 60%,² public health interventions to promote seat belt use have targeted those least likely to use them, including minority populations.³ While the preponderance of previous studies indicate that African American motorists are significantly less likely to buckle up than their white counterparts,⁴ findings have been inconsistent across at least 13 studies comparing seat belt use between Hispanics and non-Hispanics. Four studies found no ethnic differences in seat belt use,^{5–8} five studies found that prevalence of seat belt use was decreased among Hispanics,^{9–13} one study found Hispanics were more likely than non-Hispanics to buckle up,¹⁴ and three studies found interaction effects that variably involved age, gender, education, and state seat belt laws.^{15–17}

One explanation for these inconsistencies may be that Hispanic subgroups of national origin have been overlooked in previous reports. Hispanics are the most rapidly growing US subpopulation, comprising over 40 million Americans and accounting for 13% of the US populace.¹⁸ Similarly, data from Canada underscore a rapidly growing Canadian Hispanic immigrant population that is outpacing other Canadian immigrant populations in its rate of growth.¹⁹ While Hispanics are often thought of as a homogeneous population, Hispanicity subsumes 20 Spanish-speaking nationalities that differ across many dimensions including immigration history, legal status, socioeconomic status, shades of skin color, and political views, as well as health behaviors such as smoking and alcohol consumption.¹⁸ Therefore, cultural and behavioral differences between Hispanics of different national origins might affect prevalence of seat belt use. To address this question, we analyzed data from the Fatality Analysis Reporting System (FARS).

MATERIALS AND METHODS

Data source

FARS is a public domain database maintained by the US Department of Transportation's National Highway Traffic Safety Administration (NHTSA). FARS contains information about all motor vehicle crashes on US public roadways resulting in fatalities within 30 days of the crash. The FARS database became operational in 1975, but racial and Hispanic ethnic data were not collected until 1999.²⁰ Fatalities were identified from final FARS "person-level" SAS files for 1999–2003.²¹

Study population

The study population comprised Hispanic and non-Hispanic white motorists killed in crashes between 1 January 1999 and 31 December 2003 in 32 of the 50 United States with annual reporting of Hispanic ethnicity for $\geq 80\%$ of fatalities: Arizona, Arkansas, California, Connecticut, Delaware, Florida, Georgia, Illinois, Kansas, Kentucky, Louisiana, Maine, Massachusetts, Michigan, Minnesota, Mississippi, Missouri, Montana, Nebraska, Nevada, North Carolina, North Dakota, Ohio, Oklahoma, Oregon, South Dakota, Tennessee, Vermont, Washington, West Virginia, Wisconsin, and Wyoming. All decedents were aged ≥ 16 years and occupants of passenger cars or light trucks.

Hispanic ethnicity

FARS race and ethnicity data are extracted from death certificates.²¹ Analyses looked at seat belt use among

Abbreviations: CASA, Central American/South American; CU, Cuban; FARS, Fatality Analysis Reporting System; MA, Mexican American; NHTSA, National Highway Traffic Safety Administration; PR, Puerto Rican.

non-Hispanic whites and Hispanics of Central American/South American (CASA), Cuban (CU), Mexican American (MA), and Puerto Rican (PR) national origin. The CASA group included Hispanics with national origins in Argentina, Belize, Bolivia, Brazil, Chile, Colombia, Costa Rica, Dominican Republic, Ecuador, El Salvador, Galapagos Islands, Guatemala, Honduras, Nicaragua, Paraguay, Uruguay, and Venezuela. CASAs, CUs, MAs, and PRs comprise 93.5% of US Hispanics.²² Hispanics of Other Origin or Origin Not Specified were excluded because of FARS coding inconsistencies.²⁰ In this paper, “white” refers to non-Hispanic whites and “Hispanic” refers to Hispanics of any race.

Seat belt use

The FARS data on seat belt use are based on police reports, supplemented by emergency medical service and medical examiner reports.²³ Seat belt use was reported for 92% of fatalities.

Covariates

The association between Hispanic ethnicity and seat belt use was examined in relation to age group (16–24, 25–34, 35–49, 50+), gender, state seat belt law (primary, secondary), seat position (driver, front seat passenger), urban/rural region, and socioeconomic status (quartiles of median household income for driver zip codes of residence). Analyses by seat belt law compared states with primary laws (that is, motorists can be stopped and cited by law enforcement officers solely for violation of a seat belt law) and secondary laws (that is, motorists can be cited only if stopped for another offense). Except for New Hampshire, all states have either a primary or secondary adult seat belt law. Because adult seat belt laws in many states are limited to the front seat, analyses were limited to fatalities involving drivers ($n = 55\,283$) and front seat passengers ($n = 14\,741$). Analyses were limited to fatalities involving persons aged ≥ 16 because, by this age, a primary or secondary adult seat belt law applies to front seat occupants in almost every state, whereas considerable state-to-state variation exists in pediatric seat belt laws. Additionally, in all states, a learner’s permit or driver’s license can be obtained by age 16, which may engender changes in driving behavior. The FARS variable Roadway Function Class was used to classify fatalities as urban or rural.²³ Although the FARS lacks information on socioeconomic status of individual decedents, zip codes of residence are coded for drivers of vehicles involved in fatal crashes. Therefore, to adjust for socioeconomic status, driver zip codes were linked with Census 2000 data on median household income.²⁴ After excluding 847 fatalities with missing information on covariates, the linkage rate was 98% ($n = 67\,637$).

Statistical analyses

Hispanic ethnicity specific proportions of seat belt users were compared within strata of study covariates. Ninety five percent confidence intervals for proportions were calculated using StatsDirect.²⁵ The normal approximation of the binomial distribution was used to assess statistical significance of differences in proportions between Hispanics and whites. Logistic regression analyses²⁶ were conducted using SAS PROC LOGISTIC²⁷ to calculate odds ratios and 95% confidence intervals for seat belt use among Hispanics, relative to whites (that is, odds ratio for whites = 1.00), using separate models for each Hispanic subgroup. The Wald χ^2 test was used to assess whether odds ratios for seat belt use in each Hispanic subgroup differed significantly relative to whites. Age group, gender, state seat belt law, seat position, urban/rural region, and median household income

for driver zip code of residence (quartiles) were included as covariates in each model to adjust for confounding. To investigate effect modification, adjusted odds ratios were calculated within strata of the covariates. In age stratified models, age was added as a continuous covariate to account for residual confounding.

RESULTS

Demographic characteristics

The study population comprised 60 758 whites and 6879 Hispanics. By national origin, 12.7% of Hispanics were CASAs, 6.1% were CUs, 75.2% were MAs, and 6.0% were PRs (table 1). In all Hispanic subgroups, the proportions of males, drivers, and urban crashes were greater than corresponding proportions for whites. In all Hispanic subgroups except CUs, the proportion of motorists aged 16–34 was greater than the corresponding proportion for whites. Among all Hispanic subgroups except MAs, the proportion of motorists in the top two income quartiles was slightly higher than the corresponding proportion for whites. This reflects, in part, confounding due to the large number of urban crashes among CASAs, PRs, and CUs, relative to whites; median household incomes in urban areas (\$41,578) were higher than in rural areas (\$35,862). Furthermore, median household income classifies households as equal, regardless of size; compared with whites, Hispanic households are more likely to include household members outside the nuclear family who contribute to household income.¹⁸

Bivariate analysis

Overall, CASAs and MAs killed in motor vehicle crashes were significantly more likely to have buckled up than whites, but associations were not significant for CUs or PRs (table 2). Relative to their white counterparts, the prevalence of seat belt use among both CASAs and MAs was significantly higher for the 16–49 age group, men, drivers, primary law states, rural areas, and the bottom income quartile. Among CASA women, seat belt use was significantly more prevalent than among white women. MAs in secondary law states were significantly less likely to have buckled up than whites. Among both MAs and CASAs, seat belt use was more than 20% higher in primary law states than in secondary law states. Among whites, seat belt use increased by 15% in primary law states. However, among PRs and CUs, seat belt use increased by less than 10% in primary law states.

Multivariable analysis

Overall adjusted odds ratios indicated that CASAs and MAs used seat belts significantly more often than whites, but odds ratios were not significantly different from unity for CUs or PRs (table 3). Stratified adjusted odds ratios revealed that CASAs were significantly more likely to buckle up than whites in the 16–24, 25–34, and 35–49 age groups, and regardless of gender, seat position, state seat belt law, urban/rural region, or income quartile (table 4). Statistically significant associations for MAs were the same as for CASAs, except that seat belt use was not significantly different from whites in states with secondary seat belt laws and in the top income quartile. Among both CASAs and MAs, odds ratios for ages 16–49, men, drivers, rural areas and lower income quartiles were greater than corresponding odds ratios for ages 50+, women, passengers, urban areas, and higher income quartiles.

DISCUSSION

Seat belt use among all four Hispanic subgroups of national origin was as high, or higher, than the corresponding prevalence among whites. For the CASA and MA subgroups, overall seat belt use was significantly more prevalent than

Table 1 Demographic characteristics of study population by Hispanic subgroup, FARS, 1999–2003

	Non-Hispanic white	MA	CASA	Puerto Rican	Cuban
	n (%)	n (%)	n (%)	n (%)	n (%)
Age (years)					
16–24	15808 (26.0)	2027 (39.2)	282 (32.2)	131 (31.8)	77 (18.4)
25–34	9106 (15.0)	1427 (27.6)	247 (28.2)	89 (21.6)	73 (17.6)
35–49	13722 (22.6)	1078 (20.8)	198 (22.6)	104 (25.2)	86 (20.7)
50+	22117 (36.4)	643 (12.4)	149 (17.0)	88 (21.4)	180 (43.3)
Gender					
Male	39044 (64.3)	3971 (76.7)	633 (72.3)	273 (66.3)	299 (71.9)
Female	21709 (35.7)	1204 (23.3)	243 (27.7)	139 (33.7)	117 (28.1)
Seat					
Driver	48482 (79.8)	3699 (71.5)	626 (71.5)	109 (73.5)	311 (74.8)
Passenger	12271 (20.2)	1476 (28.5)	250 (28.5)	303 (26.5)	105 (25.2)
State law					
Primary	19740 (32.5)	3225 (62.3)	358 (40.9)	115 (27.9)	36 (8.6)
Secondary	41013 (67.5)	1950 (37.7)	518 (59.1)	297 (72.1)	380 (91.4)
Region					
Urban	18299 (30.1)	2359 (45.6)	522 (59.6)	246 (59.7)	256 (61.5)
Rural	42454 (69.9)	2816 (54.4)	354 (40.4)	166 (40.3)	160 (38.5)
Income*					
Bottom quartile	15097 (24.8)	1397 (27.0)	204 (23.3)	100 (24.3)	114 (27.4)
3rd quartile	15145 (24.9)	1369 (26.4)	180 (20.6)	101 (24.5)	89 (21.4)
2nd quartile	15123 (24.9)	1305 (25.2)	238 (25.2)	125 (30.3)	102 (24.5)
Top quartile	15388 (25.3)	1104 (21.3)	254 (29.0)	86 (20.9)	111 (26.7)
Total	60758	5175	876	412	416

*Median household income in driver zip code of residence for Hispanics and non-Hispanic whites combined. n, number of fatalities; CASA, Central American/South American; MA, Mexican American.

among whites, but differences were not significant for CUs or PRs. While reasons for the disproportionately high prevalence of seat belt use among CASAs and MAs are not self evident, both subgroups include large and rapidly growing immigrant subpopulations. Between 1980 and 2000, the populations of foreign born CASAs and MAs in the US grew in size by 339% and 318%, respectively.¹⁸ In contrast, the populations of foreign born PRs and CUs grew in size by only 42% and 41%, respectively.¹⁸ Therefore, immigrant status may be contributing to the associations observed for seat belt use within Hispanic subgroups.

One explanation for such an association is an acculturation phenomenon referred to as the Hispanic “epidemiological paradox” or “immigrant health paradox”, whereby the health status and health behavior of foreign born Hispanics, particularly MAs and CASAs, compares favorably with whites, despite lower average socioeconomic status.¹⁸ However, we found no evidence that seat belt use in Mexico or Spanish speaking countries in Central America and South America exceeds the national prevalence of about 80% in the US. The one study of seat belt use in a Spanish speaking Latin American country that we identified in the peer reviewed

Table 2 Bivariate analysis of seat belt use by Hispanic subgroup, FARS, 1999–2003

	Non-Hispanic white	MA	CASA	Puerto Rican	Cuban
	% (95% CI)	% (95% CI)	% (95% CI)	% (95% CI)	% (95% CI)
Overall	41.2 (40.8–41.6)	43.7 (42.4–45.1)†	47.8 (44.5–51.1)†	40.3 (35.7–45.1)	39.9 (35.3–44.7)
Age (years)					
16–24	33.5 (32.8–34.2)	42.1 (40.0–44.3)†	45.7 (39.8–51.8)†	34.4 (26.3–43.1)	20.8 (12.4–31.5)†
25–34	29.2 (28.3–30.1)	41.8 (39.2–44.4)†	43.3 (37.1–49.8)†	32.6 (23.0–43.3)	37.0 (26.0–49.1)
35–49	34.3 (33.5–35.1)	43.6 (40.6–46.6)†	46.5 (39.4–53.7)†	33.7 (24.7–43.6)	27.9 (18.8–38.6)
50+	56.0 (55.4–56.7)	53.2 (49.2–57.1)	61.1 (52.8–68.9)	64.8 (53.9–74.7)	55.0 (47.4–62.4)
Gender					
Male	34.5 (34.1–35.0)	40.4 (38.9–41.9)†	42.6 (38.9–46.5)†	35.5 (30.1–40.4)	37.8 (32.5–43.4)
Female	53.3 (52.6–54.0)	54.7 (51.9–57.6)	61.3 (55.1–67.2)†	49.6 (41.4–57.8)	45.3 (36.6–54.3)
Seat					
Driver	40.3 (39.9–40.8)	43.7 (42.1–45.3)†	48.2 (44.4–52.2)†	43.1 (34.2–52.5)	39.6 (34.3–45.1)
Passenger	44.8 (43.9–45.7)	43.8 (41.3–46.4)	46.8 (40.7–53.0)	39.3 (33.9–44.9)	41.0 (32.0–50.5)
State law					
Primary	51.5 (50.8–52.2)	54.4 (52.7–56.2)†	60.1 (54.9–65.0)†	45.2 (36.4–54.3)	47.2 (32.0–63.0)
Secondary	36.3 (35.8–36.8)	26.0 (24.1–27.9)†	39.4 (35.3–43.7)	38.4 (33.0–44.0)	39.2 (34.4–44.2)
Region					
Urban	47.0 (46.3–47.7)	44.4 (42.4–46.4)	49.4 (45.2–53.7)	41.0 (33.8–48.6)	42.2 (36.3–48.3)
Rural	38.8 (38.3–39.2)	43.2 (41.3–45.0)†	45.5 (40.4–50.7)†	39.8 (33.9–46.1)	36.2 (29.2–43.9)
Income*					
Bottom quartile	32.3 (31.6–33.1)	41.0 (38.4–43.6)†	43.6 (36.7–50.7)†	32.0 (23.0–42.1)	42.1 (32.9–51.7)
3rd quartile	39.4 (38.6–40.2)	40.9 (38.3–43.6)	45.0 (37.6–52.6)	38.6 (29.1–48.8)	43.8 (33.3–54.7)
2nd quartile	44.0 (43.2–44.8)	46.1 (43.3–48.8)	50.0 (43.5–56.5)	43.2 (34.4–52.4)	40.2 (30.6–50.4)
Top quartile	49.1 (48.3–49.9)	47.8 (44.8–50.8)	51.2 (44.9–57.5)	47.7 (36.8–58.7)	34.2 (25.5–43.8)†

*Median household income in driver zip code of residence for Hispanics and non-Hispanic whites combined.

†Prevalence of seat belt use significantly different from prevalence among non-Hispanic whites (p<0.05).

%, proportion of decedents wearing seat belt; CASA, Central American/South American; MA, Mexican American.

Table 3 Unadjusted and adjusted overall odds ratios for seat belt use by Hispanic subgroup, FARS, 1999–2003

Logistic regression model†	Unadjusted odds ratio +/- (95% CI)	Adjusted odds ratio* +/- (95% CI)
Non-Hispanic whites	1.00 (reference)	1.00 (reference)
Cuban	0.95 (0.78–1.15)	1.04 (0.85–1.28)
Puerto Rican	0.96 (0.79–1.17)	1.17 (0.95–1.44)
Mexican American	1.11 (1.04–1.17)‡	1.33 (1.25–1.42)‡
Central American/South American	1.31 (1.14–1.49)‡	1.66 (1.44–1.91)‡

*Adjusted for age group, gender, state seat belt law, seat position, region, and income (quartiles of median household income in driver zip codes of residence for Hispanics and non-Hispanic whites combined).
 †The reference group is non-Hispanic whites (that is, the odds of seat belt use among non-Hispanic whites is defined as 1.00).
 ‡Odds ratio significantly different from unity (p<0.05).

literature was conducted in Argentina,²⁸ where seat belt use prevalence was 27% in the city of Buenos Aires and 59% on national highways. This is consistent with NHTSA focus group studies indicating a perception among MA and CASA Hispanic immigrants that seat belt use in their home countries is much lower than in the US.²⁹ Furthermore, the Hispanic immigrant health paradox may apply more to health risk behaviors (for example, smoking), than to health promotion behaviors (for example, seat belt use).³⁰

A higher prevalence of seat belt use among CASAs and MAs, compared with whites, could also indicate that fatalities for these subgroups disproportionately involved motorists who were undocumented immigrants. In 2005, of about 5 million CASAs in the US, over 70% were foreign born, and approximately 2 million were undocumented. Of about 26 million MAs, almost 40% were foreign born, and approximately 6 million were undocumented.³¹ In contrast, although many PRs living in the US are foreign born (that is, born on the island of Puerto Rico), virtually all PRs are US citizens by birthright.¹⁸ While many CUs are foreign born, most foreign born CUs are naturalized US citizens who emigrated to the US as political exiles during the 1960s.¹⁸ A greater adherence

to seat belt laws among undocumented CASAs and MAs, compared with whites, could reflect greater concerns about being stopped by law enforcement officers. This is consistent with our finding that, among both Hispanic subgroups, the odds ratios for seat belt use were much higher in states with primary seat belt laws than in states with secondary laws. Increased concern of CASA and MA motorists about law enforcement is also consistent with NHTSA focus group findings indicating that MAs living along the US-Mexico border buckle up while in the US, but unbuckle their seat belts as soon as they cross the border into Mexico.²⁹ Nevertheless, because the English literacy of CASA and MA immigrants is less than their native born counterparts,¹⁸ and both roadways and concomitant traffic laws in the US are more complex than in developing countries,³² belted motorists in these Hispanic subgroups may be at disproportionately increased risk of fatal crashes. This could reflect lack of familiarity with the law, rather than deliberate non-compliance. Findings from a study by Ferguson *et al*³³ indicate that, relative to white men, Mexican American men are less likely to know the law regarding blood alcohol level threshold for driving under the influence, and more

Table 4 Stratified adjusted odds ratios* for seat belt use by Hispanic subgroup, FARS, 1999–2003

Variable	MA	CASA	Puerto Rican	Cuban
	OR (95% CI)	OR (95% CI)	OR (95% CI)	OR (95% CI)
Age (years)				
16–24	1.35 (1.22–1.50)‡	1.77 (1.38–2.27)‡	1.08 (0.74–1.58)	0.65 (0.37–1.14)
25–34	1.57 (1.39–1.78)‡	1.87 (1.43–2.44)‡	1.18 (0.74–1.86)	1.68 (1.03–2.74)‡
35–49	1.35 (1.18–1.55)‡	1.61 (1.20–2.15)‡	1.02 (0.67–1.55)	0.86 (0.53–1.39)
50+	0.92 (0.78–1.09)	1.36 (0.96–1.93)	1.72 (1.09–2.71)‡	1.12 (0.83–1.52)
Gender				
Male	1.39 (1.29–1.49)‡	1.68 (1.43–1.99)‡	1.00 (0.70–1.41)	0.70 (0.48–1.03)
Female	1.16 (1.02–1.31)‡	1.59 (1.22–2.08)‡	1.28 (0.99–1.66)	1.22 (0.96–1.56)
Seat				
Driver	1.35 (1.26–1.46)‡	1.76 (1.49–2.07)‡	1.16 (0.91–1.48)	1.14 (0.89–1.44)
Passenger	1.28 (1.14–1.45)‡	1.43 (1.09–1.88)‡	1.23 (0.81–1.86)	0.81 (0.53–1.24)
State law				
Primary	1.57 (1.45–1.70)‡	1.88 (1.50–2.35)‡	0.88 (0.60–1.30)	1.02 (0.52–2.02)
Secondary	0.94 (0.85–1.05)	1.52 (1.26–1.83)‡	1.33 (1.04–1.70)‡	1.04 (0.84–1.30)
Region				
Urban	1.14 (1.04–1.26)‡	1.56 (1.30–1.88)‡	1.10 (0.84–1.44)	1.13 (0.87–1.47)
Rural	1.48 (1.36–1.61)‡	1.75 (1.40–2.18)‡	1.25 (0.90–1.73)	0.88 (0.62–1.23)
Income†				
Bottom quartile	1.79 (1.58–2.03)‡	2.09 (1.55–2.80)‡	1.08 (0.69–1.68)	1.46 (0.98–2.17)
3rd quartile	1.30 (1.15–1.47)‡	1.71 (1.25–2.33)‡	1.24 (0.81–1.88)	1.25 (0.80–1.96)
2nd quartile	1.29 (1.14–1.46)‡	1.66 (1.27–2.18)‡	1.21 (0.83–1.76)	0.92 (0.60–1.40)
Top quartile	1.02 (0.90–1.16)	1.33 (1.02–1.72)‡	1.12 (0.71–1.74)	0.67 (0.44–1.01)

*Stratum-specific odds ratios are adjusted for non-strata covariates. Non-Hispanic whites are the reference group for all odds ratios (that is, the odds of seat belt use among non-Hispanic whites is defined as 1.00).
 †Median household income in driver zip code of residence for Hispanics and non-Hispanic whites combined.
 ‡Odds ratio significantly different from unity (p<0.05).
 CASA, Central American/South American; MA, Mexican American.

likely to overestimate the number of drinks needed to make them unsafe drivers. Yet, the same study revealed that MA men were more likely than their white counterparts to think the police would stop them if they had been drinking. In the Ferguson study,³³ about 80% of the MAs were born in Mexico, the majority of whom had immigrated to the US within the preceding 10 year period; study participants were not queried about residency status, but given the disproportionate number of MAs who were unlicensed, relative to whites, the authors speculated that many of the MAs might have been undocumented.

Variation in seat belt use by Hispanic subgroup of national origin may, in part, explain disparate findings from previous reports of seat belt use by Hispanic ethnicity. Because past studies would, to some extent, reflect the weighted average of component Hispanic ethnic subgroups, our results are broadly consistent with eight studies indicating that seat belt use prevalence among some or all Hispanics was as high, or higher than, among whites.^{5-8 14-17} Lack of adjustment for confounding by age could explain results from four studies that found Hispanics were less likely than whites to buckle up.¹⁰⁻¹³ Our analyses revealed that, for every Hispanic subgroup, adjusted odds ratios for seat belt use were greater than unadjusted odds ratios. For CASAs, MAs, and PRs the adjusted overall odds ratios increased by $\geq 20\%$. Much of this was due to confounding by age. One study reported that seat belt use among Hispanics was significantly lower than among whites after adjusting for age as a confounder,⁹ but available data on education as a measure of social class were omitted from the multivariable analysis, although the bivariate analysis revealed that Hispanics were four times less likely than whites to have graduated from high school; because education is correlated with seat belt use, confounding by educational attainment could explain the low prevalence of seat belt use among Hispanics. It is notable that the latter study was conducted in Colorado, a state with a secondary seat belt law and a Hispanic population that comprises predominantly MAs.³⁴ We found that, among MAs in secondary law states, the prevalence of seat belt use was significantly lower than among whites in the bivariate analysis, but the association was no longer statistically significant in the multivariable analysis.

This study has several strengths. First, to our knowledge, it is the largest study comparing seat belt use between Hispanics and whites conducted to date, and the first to look at seat belt use among Hispanic subgroups of national origin. Second, because decedent ethnicity was not collected until 1999, FARS was not previously available as a resource for population based studies of seat belt use among Hispanics.²⁰ Third, FARS data on seat belt use are police reported and have validity comparable to assessments of trained crash investigators.³⁵ In contrast, police reported data on seat belt use for survivors of motor vehicle crashes have less validity,³⁶ and motorists' self-reported survey data on seat belt use are subject to overreporting of up to 20% or more.³⁷ Fourth, multivariable analyses were undertaken to adjust for confounding.

Several methodologic limitations also need to be considered. First, because the study population comprised victims of fatal motor vehicle crashes, findings could, and to some extent probably do, reflect differences between whites and one or more Hispanic subgroups in terms of risk factors that are associated with both seat belt use and motor vehicle crash fatalities (for example, speeding, drinking and driving). Findings should, however, be generalizable to motorists for whom injury prevention efforts are most needed, namely those at greatest risk of dying in motor vehicle crashes. Second, median household income for driver zip code of residence was used as a proxy measure of socioeconomic

Key points

- From 1999–2003, seat belt use prevalence among Hispanics in the US was as high or higher than it was among whites.
- Seat belt use among Mexican American and Central American/South American Hispanics was significantly more prevalent than among whites. Differences were not statistically significant for Cuban or Puerto Rican Hispanics.
- National origin should be considered in injury epidemiology studies looking at Hispanic ethnicity.
- Hispanic subgroups of national origin with the fastest growing immigrant subpopulations had the highest prevalence of seat belt use.
- Preventive interventions among Hispanic and other immigrant populations may be particularly effective early in the acculturation period if they promote a lasting adoption of safe driving practices.

status. Because household income data were aggregated, they may not have reflected household incomes of individual drivers. Additionally, household incomes may have differed between drivers and passengers. Third, selection bias may have resulted from systematic differences between fatalities for which Hispanic ethnicity was and was not reported. To reduce this possibility, the study population was limited to states with reliable reporting on ethnicity. Fourth, FARS data on Hispanic ethnicity are derived from death certificates. A comparison of Hispanic ethnicity reported on death certificates with self-reported data from the Current Population Survey indicates 90% agreement for Hispanic ethnicity.³⁸ However, agreement for Hispanic subgroups is somewhat lower.

Implications for prevention

The prevalence of seat belt use among Hispanics in the US was as high, or higher than, the prevalence among whites. However, Hispanic subgroup of national origin appears to be an important determinant of seat belt use that should be considered in future injury epidemiology studies. CASAs and MAs, the two Hispanic subgroups that were significantly more likely than whites to have buckled up, are also the two Hispanic subgroups with the fastest growing immigrant subpopulations, many of whom are undocumented. If immigration status is associated with making a special effort to buckle up, in order to avoid confrontation with law enforcement officers, then interventions to increase awareness about less easily understood driving laws (for example, the relation between blood alcohol concentration and driving under the influence) might be particularly effective early in the acculturation period of Hispanic immigrants and other immigrant populations.

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LACUNAE

Never hug a Swiss cow

Keep your distance. Avoid eye contact. And even if it looks cute, never hug a Swiss cow. Responding to numerous “reports of unpleasant meetings between hikers and cattle” along Switzerland’s picture-perfect Alpine trails this summer, the Swiss Hiking Federation has laid down a few ground rules. “Leave the animals in peace and do not touch them. Never caress a calf”, the group’s guidance, posted on the website www.swiss-hiking.ch, reads. Good. For too long now, cows have been treated like women, hugged and caressed regardless of consent. This is not good when it comes to women and it is quite as bad when it comes to cows. Cows have feelings. Cows need their space. Respect cows (from Reuters, contributed by Ian Scott).