U.S. Department of Transportation
National Highway Traffic Safety Administration

TRAFFIC SAFETY FACTS
Research Note

NHTSA

DOT HS 812 477

March 2018

Additional Analysis of National Child Restraint Use Special Study: Characteristics Of Those Not Restrained

Executive Summary

The National Child Restraint Use Special Study (NCRUSS) recorded the use of car seats and belt-positioning booster seats in children up to 8 years old in 4,167 vehicles. Observers approached vehicles that carried at least one child. They interviewed the driver and collected detailed information on the restraint status of one child per vehicle, the vehicle, and its driver.

This report describes the examination of unrestrained drivers, drivers who report having ever driven with unrestrained children, and drivers transporting unrestrained children.

Of the drivers in the NCRUSS sample, 129 were unrestrained. Unrestrained drivers were more likely to be black than white. Unrestrained drivers did not differ in their gender, age, or Hispanic background.

Drivers reported whether they had ever driven with unrestrained children, and gave the reasons they had done so. Of the sampled drivers, 725 had driven with unrestrained children. 51 percent said that a "short trip" was the reason. The predominance of this reason suggests that efforts should continue to target the misperception that short trips are low in risk.

Hispanic drivers were more likely to have driven with unrestrained children than non-Hispanic drivers, and black drivers were more likely than either white or Asian drivers to have driven with unrestrained children. Age and sex were unrelated to the history of driving with unrestrained children.

Of the children sampled, 112 were observed to be unrestrained in the vehicles at the time of the survey. These children were more likely to be Hispanic than non-Hispanic, and more likely to be Black than White. Unrestrained children were more likely than restrained children to ride in the front seats, were more likely to ride with unrestrained drivers, and were more likely to be in vehicles with four or more occupants.

The drivers of unrestrained children were more likely than drivers of restrained children to be Hispanic than non-Hispanic, more likely to be Black than White, and were more likely to report using no information sources regarding child safety seats.

Background

The 2011 NCRUSS recorded the use of car seats (rear-facing infant seats, convertible seats, and forward-facing toddler seats) and belt-positioning booster seats in children up to 8 years old in 4,167 vehicles. The NCRUSS is a nationally representative survey, with data collected at 24 primary sampling units (PSUs) across the country. PSUs were established previously by a separate ongoing survey, the National Automotive Sampling System. PSUs are defined geographically and can be thought of as cities, counties, or groups of adjacent counties. PSUs include urban, rural and suburban environments and are located in 17 States (Greenwell, 2015).

Observers were certified child passenger safety technicians (CPSTs) who approached vehicles that carried at least one child. They interviewed the driver and conducted detailed observations of the driver, the vehicle, and the restraint use of one child per vehicle. Data collection occurred at child-care centers, fast-food restaurants, big-box stores, libraries, and recreation centers. When multiple children occupied the vehicle, observers rolled a 6-sided die to determine which child was to be sampled for observation. Results reported here correspond to the sampled child in each case, and do not include observations of other children in the vehicle. Descriptive results and further details are given in Greenwell (2015).

Sampling was designed to create a dataset that was nationally representative of child restraint usage. The sampling and weighting were not designed to investigate the demographic characteristics of the drivers. Demographic characteristics are reported, but interpretation must be cautious.

The National Occupant Protection Use Survey (NOPUS) from 2011 measured some similar variables, and those are mentioned where applicable. Though current sample sizes are small, the patterns of proportions are generally comparable to NOPUS results. However, it is important to remember throughout that NOPUS samples vehicle occupants in the general population, while NCRUSS sampled only vehicles with children 8 or younger.

The NCRUSS survey offers field observations of child restraint use without expectation of inspection. That is, drivers consented to inspection but did not plan or expect it, and the restraint use for the children was not biased by any expectation, desire for self-presentation, or other contaminating behavior.

This report examines the characteristics of unrestrained drivers, drivers who report having ever driven with unrestrained children, drivers transporting unrestrained children, and the unrestrained children.

Statistical Methods

The NCRUSS (2011) data collection and weighting plan was designed to represent the restraint use of children under age 9. That is, sampling and weighting adjusted the data to represent the use of the types of car seats. Each case is the restraint (or non-restraint) used by a sampled child, and the information collected in association with that child.

SAS survey methods for subgroup analyses use only cases defined by the subgroup in the calculation of point estimates, but use the entire sample in the variance estimation, including the calculation of standard errors to account for variability resulting from subgroup creation that is unrelated to the survey design. Since the NCRUSS sampling weights are relative to the sampled child in the vehicle, reporting of results related to drivers must be in reference to the sampled children.

Descriptive statistics report weighted frequencies, with standard errors (SE), 95 percent confidence intervals (CI), and design effects. All reported percentages are weighted percentages.

Two kinds of descriptive percentages are reported in this analysis. Within subgroups, descriptive percentages are reported to describe the subgroup. For example, 44 percent of unrestrained drivers are male. This describes the unrestrained drivers, but does not show whether 44 percent is a high or low percentage—the information might be very different, depending on how many drivers in the full sample are male.

Subgroups are therefore also described in terms of their membership in the larger context, and inferential statistics mostly use these weighted percentages. For example; of male drivers in NCRUSS, 8.5 percent are unrestrained. That is, when we look at the male drivers in the full sample, 8.5 percent of those male drivers were unrestrained. When this is compared to the percentage of all female drivers who were unrestrained, we can judge whether one gender is significantly more likely to drive unrestrained than the other when transporting children 8 or younger.

Sample sizes are small for many of the subgroups. As the subgroup sample size decreases, the confidence we have in our point estimates decreases. The corresponding weighted percentages may become less reliable (Greenwell, 2015) as reflected in larger confidence intervals, and conclusions become less advisable.

Particularly for weighted percentages with large confidence intervals, it should be emphasized that the results are estimates and that there exists uncertainty about the true difference in proportion between subgroups. While a difference between subgroups may be found to be statistically significant, its practical significance must also be thoroughly evaluated.

In some of these groups that form the larger context, some cells are too small for analysis. Therefore, some subgroups may be combined. For example, too few Native Hawaiian/Other Pacific Islanders appear in the sample for analysis. Rather than exclude these cases, they are recoded with those who self-identified as "Other" to form an "All Other Races" group for analysis. When groups must be recoded in this way, descriptive statistics are given for both uncombined and combined groupings.

When subgroups are small, interpretation must be cautious. However, larger surveys conducted in the same year offer some converging findings. Both the NOPUS and the National Survey of Booster Seats (NSUBS) conducted data collection in 2011. Though their focus is different (NOPUS vehicle occupants in the general population versus NCRUSS occupants in vehicles carrying passengers who are 8 or younger), these studies provide converging evidence for many of the findings. These are noted in the body of the results.

For inferential statistics, the Rao-Scott chi-square test, a design-adjusted version of the Pearson chi-square test appropriate for handling complex survey data was used to test for association and differences in frequencies. In some comparisons (e.g., when comparing restrained and unrestrained groups) cell sizes differ greatly. The second-order Rao-Scott (design-adjusted) chi-square is appropriate when cell design effects vary substantially, as they do when cell sizes vary markedly. When testing associations and differences of frequencies between greatly unequal cell sizes, the second-order Rao-Scott (design-adjusted) chi-square is used. Throughout, the significance level was $p < .05$ for analyses.

Unrestrained Drivers

The majority of drivers were correctly restrained. There were 3,161 properly restrained with lap and shoulder belts, as shown in Table 1. For the purposes of this report, restrained drivers are those using the lap and shoulder belt; unrestrained drivers are those with no restraint use; those using only lap belts or only shoulder belts are excluded from further analysis (3 cases total).

Of those drivers with known restraint use, 96.0 percent were restrained, as shown in Table 1. This observed driver restraint use in drivers with a passenger 8 or younger was higher than that observed in other work; for example, only 87 percent of drivers with at least one passenger of any age were observed using seat belts in the 2011 NOPUS (Pickrell & Ye, 2013). There were 129 drivers unrestrained (weighted 4.0%; SE of percent=0.88%; 95% CI=2.1%, 5.9%; design effect=6.60).

Table 1
Driver Restraint Use

Restraint Use	(n)	Weighted Percentage
Lap & Shoulder Belt	3,161	96.0%
Unrestrained	129	4.0%

Demographic Characteristics of Unrestrained Drivers

The NCRUSS data offers the opportunity to investigate the demographic characteristics of unrestrained drivers who are traveling with children in their vehicles. Information about these drivers may lead to useful strategies and tactics for increasing restraint usage. Overall descriptive statistics for the demographics of unrestrained drivers appear in Table 2. Table 3 describes the full sample of drivers with known restraint status.

Table 2
Descriptive Statistics for the Demographics of Unrestrained Drivers and Restrained Drivers

		Unrestrained Drivers			Restrained Drivers		
	Driver Characteristics	(n)	Weighted Percentage	95% CI	(n)	Weighted Percentage	95% CI
Gender	Male	39	43.9%	22.2% - 65.6%	672	19.7%	17.3% - 22.0%
	Female	90	56.1%	34.4% - 77.8%	2,489	80.3%	78.0% - 82.7%
Ethnicity	Not Hispanic	106	91.9%	85.3% - 98.5%	2,549	91.8%	88.7% - 95.0%
	Hispanic	15	8.1%	1.5% - 14.7%	490	8.2%	5.0% - 11.3%
Race	White	42	35.3%	14.8% - 55.8%	2,361	75.9%	62.2% - 89.5%
	Black	67	63.2%	43.5% - 82.9%	475	19.1%	5.6% - 32.6%
	Asian	1	0.2%	0.0% - 0.5%	135	4.2%	1.7% - 6.7%
	Native Hawaiian/Other Pacific Islander	1	0.3%	0.0% - 1.0%	11	0.2%	0.0% - 0.5%
	Other	3	1.1%	0.0% - 2.2%	33	0.6%	0.2% - 0.9%
Age Group	>50 Years Old	11	5.3%	0.7% - 9.9%	224	5.4%	3.2% - 7.5%
	30-50 Years Old	56	63.6%	47.5% - 79.6%	2,114	75.1%	68.6% - 81.6%
	<30 Years Old	34	31.1%	11.3% - 50.9%	606	19.5%	14.6% - 24.4%

Table 3
Demographic Characteristics of All Drivers With Known Restraint Status

	Demographic Characteristics of Drivers Where Restraint Status Is Known	(n)	Weighted Percentage	95% CI
Gender	Male	711	20.6%	18.1% - 23.2%
	Female	2,579	79.4%	76.8% - 81.9%
Ethnicity	Not Hispanic	2,655	91.8%	88.8% - 94.9%
	Hispanic	505	8.2%	5.1% - 11.2%
Race	White	2,403	74.4%	61.1% - 87.6%
	Black	542	20.7%	7.7% - 33.8%
	Asian	136	4.1%	1.6% - 6.5%
	Native Hawaiian/Other Pacific Islander	12	0.3%	0.0% - 0.5%
	Other	36	0.6%	0.2% - 0.9%
Race	White	2,403	74.4%	61.1% - 87.6%
	Black	542	20.7%	7.7% - 33.8%
	Asian	136	4.1%	1.6% - 6.5%
	All Other Races	48	0.8%	0.4% - 1.3%
Age Group	>50 Years Old	235	5.4%	3.2% - 7.5%
	30-50 Years Old	2,170	74.7%	68.4% - 81.0%
	<30 Years Old	640	19.9%	15.1% - 24.7%

It is important to place the proportions in the proper context. For example, the children in the sample were driven by men only 21 percent of the time, but 44 percent of the unrestrained drivers were male. The proportion of unrestrained male drivers is most informative in the context of the proportion of male drivers overall.

Male and female drivers were not significantly different in their rates of restraint use (Second Order Rao-Scott chi-square: F(1,12)=3.03, p=0.11, design correction=14.95), as shown in Table 4. Both of these groups of drivers with passengers 8 or younger were restrained at higher rates than that observed in the general population in NOPUS 2011, where 81 percent of males and 86 percent of females used seat belts (Pickrell & Ye, 2013).

Table 4
Unrestrained Drivers by Gender

Subgroup	(n)	(n) of Subgroup Who Were Unrestrained	% of Subgroup Who Were Unrestrained	Standard Error of the Percentage	Confidence Intervals	Design Effect
Male Drivers	711	39	8.5%	3.31%	1.3%, 15.7%	10.00
Female Drivers	2,579	90	2.8%	0.45%	1.8%, 3.8%	1.91

Driver age was not related to restraint use. Driver age was recoded into three categories for the unrestrained drivers: over age 50, age 30 to 50, or age under 30; as shown in Table 5. The age groups did not differ in their restraint use (Second Order Rao-Scott chi-square: F(1.16,13.91)=1.60, p=0.23, design correction=2.60).

Table 5
Unrestrained Drivers by Age

Subgroup	(n)	(n) of Subgroup Who Were Unrestrained	% of Subgroup Who Were Unrestrained	Standard Error of the Percentage	Confidence Intervals	Design Effect
Under Age 30	640	34	5.2%	1.59%	1.7%, 8.6%	3.30
Age 30-50	2,170	56	2.8%	0.92%	0.8%, 4.8%	6.67
Over Age 50	235	11	3.3%	1.77%	0.0%, 7.2%	2.32

Hispanic and non-Hispanic drivers were not significantly different in their restraint use (Second Order Rao-Scott chi-square: F(1,12)=0.0001, p=0.99, design correction=1.63). This is not consistent with Pickrell and Ye (2013b), who found lower restraint use among Hispanic vehicle occupants traveling with children. It must be noted that the subsample of unrestrained Hispanic drivers is very small (n = 15).

Table 6
Unrestrained Drivers by Hispanic Background

Subgroup	(n)	(n) of Subgroup Who Were Unrestrained	% of Subgroup Who Were Unrestrained	Standard Error of the Percentage	Confidence Intervals	Design Effect
Hispanic Drivers	505	15	3.7%	1.53%	0.4%, 7.1%	3.28
Non-Hispanic Drivers	2,655	106	3.8%	0.92%	1.7%, 5.8%	6.22

White and Black drivers differ in their restraint use; see Table 7. Driver race was recoded to include only White and Black drivers in the comparison; other groups were excluded due to inadequate sample sizes. Black drivers have higher nonrestraint than White drivers (Second Order Rao-Scott chi-square: F(1,12)=6.18, p < .05, design correction=19.81). Though these observed nonrestraint rates are, again, lower than other surveys, the higher incidence of unrestrained Black drivers than White drivers is consistent with other work conducted in the same year for drivers (Pickrell & Ye, 2013a) and for vehicle occupants traveling with children (Pickrell & Ye, 2013b).

The higher rate of nonrestraint by Black drivers suggests a continued area of focus for outreach efforts.

Table 7
Unrestrained Drivers by Race

Subgroup	(n)	(n) of Subgroup Who Were Unrestrained	% of Subgroup Who Were Unrestrained	Standard Error of the Percentage	Confidence Intervals	Design Effect
Black Drivers	542	67	11.2%	4.75%	0.8%, 21.5%	12.30
White Drivers	2,403	42	1.7%	0.44%	0.8%, 2.7%	2.70

Drivers Who Have Ever Driven With Unrestrained Children

Drivers were asked "If you have ever driven somewhere when a child in the vehicle was not secured in a child safety seat or booster, describe the primary reason." This measure does not reflect the contemporaneous restraint status of the sampled child: drivers reported whether they had ever driven with unrestrained children. The majority of drivers (n=3,255, weighted 84.6%; SE of percent=2.02%; 95% CI=80.1%, 89.0%; design effect=12.49) said they had never driven with unrestrained children.

For all sampled children, 725 drivers (weighted 15.4%; SE of percent=2.02%; 95% CI=11.0%, 19.9%; design effect=12.49) acknowledged having driven with unrestrained children. Their responses were coded into several categories, as shown in Table 8.

Table 8
Reason for Having Ever Driven With Unrestrained Children

Reason	n Out of 725 Cases	Weighted Percentage	95% CI
Short trip	370	51.0%	29.2% - 72.7%
No seat/booster in vehicle	157	18.9%	7.3% - 30.5%
Other	93	13.1%	6.6% - 19.6%
Child unbuckled self	37	7.1%	3.0% - 11.2%
Forgot to check	38	5.7%	1.6% - 9.9%
Too many passengers in the vehicle	23	3.2%	0.6% - 5.9%
Child does not cooperate	7	1.0%	0.4% - 1.6%

The most common code assigned to the reason was "Short Trip," capturing 51.0 percent of the responses (SE of percent=10.00%; 95% CI=29.2%, 72.7%; design effect=28.96). The next most frequently assigned code was "No Seat/Booster in Vehicle," 18.9 percent (SE of percent=5.32%; 95% CI=7.3%, 30.5%; design effect=13.36). The remaining responses,

"Child Unbuckled Self," "Forgot to Check," "Too Many Passengers," and "Child Does Not Cooperate" appeared in descending frequency. "Other" captured 13.1 percent (SE of percent=2.98%; 95% CI=6.6%, 19.6%; design effect=5.68) of the responses, suggesting that a wide variety of reasons are given for not using a child safety seat or booster seat.

The predominance of the "Short Trip" reason suggests that efforts should continue to target the misperception that short trips are low-risk. Unlike "No Seat/Booster in Vehicle," which requires a device to address, the "Short Trip" reason can be targeted by education and outreach.

Demographic Characteristics of Drivers Who Had Driven With Unrestrained Children

Basic demographic characteristics of the 725 drivers (weighted 15.4% of all drivers in the sample) who reported having driven with unrestrained children are shown in Table 9. Characteristics of the larger group, those drivers whose history was known, are shown in Table 10.

Table 9
Demographic Characteristics of Drivers Who Have Ever Driven With Unrestrained Child

	Demographic Characteristics of Drivers Who Have Ever Driven With Unrestrained Child	(n)	Weighted Percentage	95% CI
Gender	Male	148	23.6%	16.8% - 30.4%
	Female	577	76.4%	69.6% - 83.2%
Ethnicity	Not Hispanic	582	86.8%	80.1% - 93.4%
	Hispanic	132	13.2%	6.6% - 19.9%
Race	White	499	66.5%	53.3% - 79.8%
	Black	162	29.1%	15.6% - 42.5%
	Asian	22	2.8%	0.8% - 4.7%
	Native Hawaiian/Other Pacific Islander	3	0.3%	0.0% - 0.8%
	Other	13	1.3%	0.0% - 3.1%
Age Group	50 Years Old	56	6.3%	3.9% - 8.7%
	30-50 Years Old	465	68.8%	58.5% - 79.0%
	30 Years Old	154	24.9%	15.6% - 34.3%

Table 10
Demographic Characteristics of All Drivers With Data Present for History of Ever Driving With Unrestrained Child

	Demographic Characteristics of All Drivers With Data Present for History of Ever Driving With Unrestrained Child	(n)	Weighted Percentage	95% CI
Gender	Male	846	20.9%	18.6% - 23.3%
	Female	3,134	79.1%	76.7% - 81.4%
Ethnicity	Not Hispanic	3,276	91.1%	87.7% - 94.6%
	Hispanic	600	8.9%	5.4% - 12.3%
Race	White	2,966	76.2%	65.7% - 86.8%
	Black	617	18.2%	8.1% - 28.3%
	Asian	175	4.6%	2.0% - 7.2%
	Native Hawaiian/Other Pacific Islander	12	0.2%	0.0% - 0.4%
	Other	54	0.7%	0.2% - 1.2%
Race	White	2,966	76.2%	65.7% - 86.8%
	Black	617	18.2%	8.1% - 28.3%
	Asian	175	4.6%	2.0% - 7.2%
	All Other Races	66	0.9%	0.4% - 1.4%
Age Group	50 Years Old	276	5.0%	3.5% - 6.6%
	30-50 Years Old	2,699	75.8%	70.9% - 80.6%
	30 Years Old	777	19.2%	15.4% - 23.1%

Again, weighted proportions are most informative in the context of the overall group proportions. For example, 23.6 percent of drivers who have ever driven with unrestrained children are male (Table 9); 20.9 percent of all the drivers (with known data) were male (Table 10).

Male and female drivers, shown in Table 11, did not differ significantly in whether they had ever driven with an unsecured child (Second Order Rao-Scott chi-square: F(1,12)=0.77, p=0.40, design correction=4.15).

Table 11
Drivers Who Had Ever Driven With Unrestrained Children, by Driver Gender

Subgroup	(n)	(n) of Subgroup Who Had Ever Driven With Unrestrained Child	% of Subgroup Who Had Ever Driven With Unrestrained Child	Standard Error of the Percentage	Confidence Intervals	Design Effect
Male Drivers	846	148	17.4%	3.65%	9.5%, 25.4%	7.80
Female Drivers	3,134	577	14.9%	1.82%	11.0%, 18.9%	8.15

Age was not related to a history of driving with unrestrained children. Driver age was recoded into three categories for the drivers who had driven with unrestrained children: over age 50, age 30 to 50, or age under 30; see Table 12. Age groups did not differ significantly; and of drivers under 30, 19.9 percent had driven with unrestrained children (SE of percent=2.18; 95% CI=15.2%, 24.6%; design effect=2.30) (Second Order Rao-Scott chi-square: F(1.61,19.30)=2.71, p=0.10, design correction=3.35).

Table 12
Drivers Who Had Ever Driven With Unrestrained Children, by Driver Age

Subgroup	(n)	(n) of Subgroup Who Had Ever Driven With Unrestrained Child	% of Subgroup Who Had Ever Driven With Unrestrained Child	Standard Error of the Percentage	Confidence Intervals	Design Effect
Under Age 30	777	154	19.9%	2.18%	15.2%, 24.6%	2.30
Age 30-50	2,699	465	13.9%	2.60%	8.3%, 19.6%	15.17
Over Age 50	276	56	19.3%	4.00%	10.6%, 28.0%	2.82

Hispanics and non-Hispanics were significantly different (see Table 13); more Hispanic drivers than non-Hispanic drivers had driven with an unsecured child (Second Order Rao-Scott chi-square: F(1,12)=6.99, $p < .05$, design correction=2.42). Though the confidence intervals overlap, only inferential testing can establish significance or its absence, and the effect is statistically significant.

Table 13
Drivers Who Had Ever Driven With Unrestrained Children, by Driver Hispanic Background

Subgroup	(n)	(n) of Subgroup Who Had Ever Driven With Unrestrained Child	% of Subgroup Who Had Ever Driven With Unrestrained Child	Standard Error of the Percentage	Confidence Intervals	Design Effect
Hispanic Drivers	600	132	23.3%	3.13%	16.5%, 30.2%	3.29
Non-Hispanic Drivers	3,276	582	14.9%	1.92%	10.7%, 19.1%	9.49

Drivers also differed by race. Driver race was recoded into four categories: White, Black, Asian, and All Other Races, as shown in Table 14. The overall F statistic was significant (Second Order Rao-Scott chi-square: F(1.72,20.68)=4.12, $p < .05$, design correction=5.20).

Table 14
Drivers Who Had Ever Driven With Unrestrained Children, by Driver Race

Subgroup	(n)	(n) of Subgroup Who Had Ever Driven With Unrestrained Child	% of Subgroup Who Had Ever Driven With Unrestrained Child	Standard Error of the Percentage	Confidence Intervals	Design Effect
Black Drivers	617	162	25.0%	5.62%	12.8%, 37.3%	10.39
White Drivers	2,966	499	13.7%	2.03%	9.2%, 18.1%	10.36
Asian Drivers	175	22	9.3%	2.39%	4.1%, 14.5%	1.18
All Other Races	66	16	28.0%	12.98%	0.0%, 56.3%	5.43

Based on the significant overall Second Order Rao-Scott chi-square F statistic, comparisons were made between cells. Black drivers were more likely than white drivers to have driven with unrestrained children, (Second Order Rao-Scott chi-square: $F(1,12)=5.47$, $p < .05$, design correction=9.81). Black drivers were also more likely than Asian drivers to have driven with an unsecured child (Second Order Rao-Scott chi-square: $F(1,12)=6.43$, $p < .05$, design correction=2.88). White and Asian drivers did not differ significantly from each other (Second Order Rao-Scott chi-square: $F(1,12)=3.32$, $p=0.09$, design correction=0.83). Consistent with the results for unrestrained drivers, a greater proportion of Black and of all other races had driven with an unsecured child compared to Asian drivers and White drivers.

Unrestrained Children

Unrestrained children were those who were observed to be unrestrained at the time of data collection. Where child restraint status was known, most children were restrained in car seats or booster seat (n=3,818; weighted 93.9%; SE of percent=1.28%; 95% CI=91.1%, 96.6%; design effect=11.77). Some children (n=242, weighted 4.2%; SE of percent=1.00%; 95% CI=2.0%, 6.4%; design effect=10.50) were buckled into seat belts only (this does not include children in booster seats). Though a seat belt is not the correct restraint for a child under age 9, these children are not coded as unrestrained.

Of the sampled children, 106 children were unrestrained (weighted 2.0%; SE of percent=0.47%; 95% CI=0.9%, 3.0%; design effect=4.73). These children were not buckled in with seat belts and were not sitting in car seats or booster seats. An additional 6 children were observed to be using seat belts that were not buckled, leaving them unrestrained. This increased the total of unrestrained children to 112, or 2.1 percent (SE of percent=0.48%; 95% CI=1.0%, 3.1%; design effect=4.70). These 112 unrestrained children were retained for analysis.

Demographic Characteristics of Unrestrained Children

General demographic characteristics of the 112 unrestrained children are shown in Table 15. For context, Table 16 shows the demographic characteristics of children who were restrained in car seats, and Table 17 shows the demographics of children who were restrained by seat belts only. Table 18 shows the broader context of all children whose restraint status was known, and Table 19 shows the very broadest context, with demographic information for all sampled children. Subgroups may not sum to 112 because of missing data in some cells.

Table 15
General Demographic Characteristics of Unrestrained Children

	Characteristics of Unrestrained Children	(n)	Weighted Percentage	95% CI
Gender	Male	59	54.1%	29.7% - 78.4%
	Female	48	45.9%	21.6% - 70.3%
Ethnicity	Not Hispanic	76	85.0%	74.6% - 95.3%
	Hispanic	28	15.0%	4.7% - 25.4%
Race	White	38	32.3%	5.3% - 59.3%
	Black	58	65.5%	39.8% - 91.3%
	Asian	0	0.0%	NA
	Native Hawaiian/Other Pacific Islander	0	0.0%	NA
	Other	4	2.2%	0.0% - 5.3%
Age Group	4-8 Years Old	80	77.3%	63.4% - 91.1%
	2-3 Years Old	20	19.0%	5.9% - 32.0%
	<2 Years Old	2	3.8%	0.0% - 10.9%
Seating Position of Sampled Child	Front Row, Middle	2	0.3%	0.0% - 1.0%
	Front Row, Right Side	22	22.0%	3.4% - 40.6%
	Second Row, Left Side	30	23.2%	7.2% - 39.2%
	Second Row, Middle	14	10.3%	2.1% - 18.4%
	Second Row, Right Side	43	44.0%	12.9% - 75.0%
	Third Row, Left Side	1	0.2%	0.0% - 0.7%
Location of Sampled Child	Vehicle Seat	100	93.1%	89.6% - 96.6%
	Floor	2	0.04%	0.0% - 0.1%
	Lap of Occupant	6	5.5%	2.8% - 8.2%
	Other	3	1.3%	0.0% - 3.1%
Driver Restraint Status	Unrestrained	53	66.0%	49.8% - 82.3%
	Lap and Shoulder Belt	43	34.0%	17.7% -50.2%
No. of Passengers <9 Years Old	One Child Passenger <9 Years Old	65	34.5%	19.3% - 49.8%
	More Than One Child Passenger <9 Years Old	38	65.5%	50.2% - 80.7%
Vehicle Type	Passenger Car	71	76.8%	63.3% - 90.3%
	Minivan or Van	10	8.5%	0.6% - 16.3%
	SUV	21	10.4%	2.9% - 18.0%
	Pickup Truck	9	4.3%	0.8% - 7.8%

Table 16
Demographic Characteristics of Children Who Were Restrained in Car Seats

	Characteristics of Children Restrained in CRS/Device	(n)	Weighted Percentage	95% CI
Driver Restraint Status	Unrestrained	65	2.5%	1.1% - 3.9%
	Lap and Shoulder Belt	2,935	97.5%	96.1% - 98.9%
No. of Passengers <9 Years old	One Child Passenger <9 Years Old	2,592	49.7%	46.0% - 53.4%
	More Than One Child Passenger <9 Years Old	1,203	50.3%	46.6% - 54.0%
Vehicle Type	Passenger Car	1,676	39.5%	34.4% - 44.7%
	Minivan or Van	632	18.1%	14.1% - 22.2%
	SUV	1,329	38.3%	31.9% - 44.6%
	Pickup Truck	163	4.1%	2.6% - 5.6%

Table 17
Demographics of Children Who Were Restrained by Seat Belts Only

	Characteristics of Children Restrained by Seat Belt Only	(n)	Weighted Percentage	95% CI
Driver Restraint Status	Unrestrained	10	5.7%	0.0% - 11.6%
	Lap and Shoulder Belt	169	94.3%	88.4% - 100%
No. of Passengers <9 Years old	One Child Passenger <9 Years Old	156	55.9%	44.2% - 67.7%
	More Than One Child Passenger <9 Years Old	63	44.1%	32.3% - 55.8%
Vehicle Type	Passenger Car	104	39.0%	17.0% - 60.9%
	Minivan or Van	38	24.0%	9.8% - 38.1%
	SUV	59	30.3%	16.4% - 44.2%
	Pickup Truck	20	6.7%	2.8% - 10.6%

Table 18
Broader Context of All Children Whose Restraint Status Was Known

	Characteristics of Sampled Children Where Restraint Status Is Known	(n)	Weighted Percentage	95% CI
Gender	Male	2,104	49.9%	47.5% - 52.3%
	Female	1,986	50.1%	47.7% - 52.5%
Ethnicity	Not Hispanic	3,358	89.7%	86.1% - 93.2%
	Hispanic	636	10.3%	6.8% - 13.9%
Race	White	2,968	75.3%	64.8% - 85.8%
	Black	702	19.0%	8.7% - 29.2%
	Asian	187	4.7%	2.2% - 7.1%
	Native Hawaiian/Other Pacific Islander	9	0.1%	0.0% - 0.1%
	Other	63	1.0%	0.4% - 1.6%
Race	White	2,968	75.3%	64.8% - 85.8%
	Black	702	19.0%	8.7% - 29.2%
	Asian	187	4.7%	2.2% - 7.1%
	All Other Races	72	1.1%	0.4% - 1.7%
Age Group	4-8 Years Old	1,894	44.2%	39.8% - 48.6%
	2-3 Years Old	1,390	33.3%	30.9% - 35.8%
	<2 Years Old	809	25.5%	19.9% - 25.1%

Table 19
Very Broadest Context, With Demographic Information for All Sampled Children

	Characteristics of All Sampled Children	(n)	Weighted Percentage	95% CI
Gender	Male	2,114	50.0%	47.6% - 52.4%
	Female	1,992	50.0%	47.6% - 52.4%
Ethnicity	Not Hispanic	3,367	89.5%	85.9% - 93.2%
	Hispanic	642	10.5%	6.8% - 14.1%
Race	White	2,979	75.2%	64.8% - 84.7%
	Black	706	19.1%	8.9% - 29.3%
	Asian	188	4.7%	2.2% - 7.1%
	Native Hawaiian/Other Pacific Islander	9	0.1%	0.0% - 0.1%
	Other	63	1.0%	0.4% - 1.6%
Race	White	2,979	75.2%	64.8% - 84.7%
	Black	706	19.1%	8.9% - 29.3%
	Asian	188	4.7%	2.2% - 7.1%
	All Other Races	72	1.0%	0.4% - 1.7%
Age Group	4-8 Years Old	1,909	44.4%	40.0% - 48.8%
	2 -3 Years Old	1,391	33.2%	30.8% - 35.7%
	<2 Years Old	809	22.4%	19.8% - 25.0%

Male and female children were not significantly different by non-restraint status (see Table 20) (Second Order Rao-Scott chi-square: F(1.64,19.63)=0.27, p=0.72, design correction=3.05).

Table 20
Unrestrained Children by Gender

Subgroup	(n)	(n) of Subgroup Who Were Unrestrained	% of Subgroup Who Were Unrestrained	Standard Error of the Percentage	Confidence Intervals	Design Effect
Male Children	2,104	59	2.1%	0.77%	0.4%, 3.8%	6.15
Female Children	1,986	48	1.8%	0.48%	0.7%, 2.8%	2.60

Hispanic children were more likely to be unrestrained than non-Hispanic children (see Table 21) (Second Order Rao-Scott chi-square: F(1.54,18.45)=4.17, p < .05, design correction=2.70). This is consistent with the results of a larger study of child restraint usage conducted in the same year, which found that Hispanic children 12 and younger were less likely to be restrained than non-Hispanic children (Pickrell & Ye, 2013b).

Table 21
Unrestrained Children by Hispanic Background

Subgroup	(n)	(n) of Subgroup Who Were Unrestrained	% of Subgroup Who Were Unrestrained	Standard Error of the Percentage	Confidence Intervals	Design Effect
Hispanic Children	636	28	2.5%	0.74%	0.9%, 4.1%	1.41
Non-Hispanic Children	3,358	76	1.7%	0.51%	0.5%, 2.8%	5.30

Black children were more likely to travel unrestrained than White children. They were also more likely to be unrestrained than children of a combined All Other Races category. No sampled Asian or Native Hawaiian/Other Pacific Islander children were unrestrained. Child race was recoded into three groups (White, Black, and All Other Races) in order to test for association and differences, as shown in Table 22. Black children had lower restraint usage rates than White children and all other races (Second Order Rao-Scott chi-square: F(1.60,19.26)=8.31, p < .05, design correction=4.36). Particular caution must be used in the interpretation of these results given the small subgroup samples. However, the relative rates are consistent with those found in the 2011 NSUBS survey (Pickrell & Ye, 2013b).

Table 22
Unrestrained Children by Race

Subgroup	(n)	(n) of Subgroup Who Were Unrestrained	% of Subgroup Who Were Unrestrained	Standard Error of the Percentage	Confidence Intervals	Design Effect
Black Children	702	58	7.0%	1.82%	3.1%, 11.0%	3.56
White Children	2,968	38	0.9%	0.44%	0.0%, 1.8%	6.75
All Other Races	259	4	0.8%	0.58%	0.0%, 2.0%	1.11

Older children were more likely to be unrestrained than younger children. Child age was recoded into three categories: age 4 to 8 years old, age 2 to 3 years old, and less than 2 years old. The age groups differed in their restraint use (Second Order Rao-Scott chi-square: $F(2.20,26.37)=13.37$, $p < .05$, design correction=3.01).

Table 23
Unrestrained Children by Age

Subgroup	(n)	(n) of Subgroup Who Were Unrestrained	% of Subgroup Who Were Unrestrained	Standard Error of the Percentage	Confidence Intervals	Design Effect
Less Than Age 2	809	2	0.3%	0.29%	0.0%, 0.97%	2.10
Age 2-3	1,390	20	1.1%	0.53%	0.0%, 2.3%	3.46
Age 4-8	1,894	80	3.4%	0.81%	1.7%, 5.2%	3.72

Vehicle Type and Seating Position for Unrestrained Children

Restraint use by vehicle type (e.g., passenger car, minivan or van, SUV, pickup truck), was known for 111 of the 112 cases of unrestrained children and is shown in Table 24. In one case, vehicle type was unknown; that case was excluded from analysis.

In passenger cars, 3.7 percent of children were unrestrained (SE of percent=0.84%; 95% CI=1.9%, 5.6%; design effect=3.59) and 92.7 percent of children were restrained in car seats (SE of percent=1.9%; 95% CI=88.4%, 96.9%; design effect=10.19). In minivans or vans, 0.9 percent of children were unrestrained (SE of percent=0.4%; 95% CI=0.0%, 1.9%; design effect=1.42) and 94.2 percent of children were restrained in car seats (SE of percent=1.1%; 95% CI=91.8%, 96.6%; design effect=1.52). In SUVs, 0.5 percent of children were unrestrained (SE of percent=0.2%; 95% CI=0.1%, 1.0%; design effect=1.15) and 96.4 percent of children were restrained in car seats (SE of percent=1.0%; 95% CI=94.3%, 98.5%; design effect=3.75). In pickup trucks, 2.0 percent of children were unrestrained (SE of percent=0.7%; 95% CI=0.6%, 3.5%; design effect=0.43) and 92.0 percent of children were in car seats (SE of percent=2.6%; 95% CI=86.4%, 97.7%; design effect=1.73).

These differences among vehicle types are statistically significant (Second Order Rao-Scott chi-square: $F(3.10, 37.22)=4.00$, $p < .05$, design correction=2.31). Cell sample sizes are too small to allow reliable pairwise comparisons.

Table 24
Restraint Use and Vehicle Type

		Unrestrained Children	Children in Seat Belt Only	Children in Car Seat	Total Sample (Where Vehicle Type Is Known)
Passenger Car	n	71	104	1,676	1,851
	Weighted %	3.7%	3.6%	92.7%	40.2%
	95% CI	1.9% - 5.6%	0.6% - 6.6%	88.4% - 96.9%	34.6% - 45.9%
Minivan or Van	n	10	38	632	680
	Weighted %	0.9%	4.9%	94.2%	18.1%
	95% CI	0.0% - 1.9%	2.4% - 7.4%	91.8% - 96.6%	14.1% - 22.2%
SUV	n	21	59	1,329	1,409
	Weighted %	0.5%	3.0%	96.4%	37.4%
	95% CI	0.1% - 1.0%	1.0% - 5.0%	94.3% - 98.5%	31.1% - 43.7%
Pickup Truck	n	9	20	163	192
	Weighted %	2.0%	6.0%	92.0%	4.2%
	95% CI	0.6% - 3.5%	0.5% - 11.5%	86.4% - 97.7%	2.7% - 5.7%

The seating positions of unrestrained children are shown in Table 25.

Seating positions for children in car seats are in Table 26.

Table 25
Seating Positions of Unrestrained Sampled Children

	Weighted Percentages (n)		
	Left	Center	Right
Front Row	Driver	<1% (2)	22.0% (22)
Second Row	23.2% (30)	10.3% (14)	44.0% (43)
Third Row	<1% (1)	0.0% (0)	0.0% (0)

Table 26
Seating Positions of Children in Car Seats

	Weighted Percentages (n)		
	Left	Center	Right
Front Row	Driver	<1% (3)	1% (42)
Second Row	37.1% (1375)	12.0% (558)	47.4% (1752)
Third Row	1.2% (36)	<1% (6)	1% (45)

Almost a quarter of the unrestrained children traveled in the front row of vehicle seating, as shown in Table 27. Unrestrained children are more likely to occupy the front seat of the vehicle than children restrained in CRS/devices or children restrained by seat belts only (Second Order Rao-Scott chi-square: $F(1.70,20.45)=3.88$, $p < .05$, design correction=24.01). Their presence in the front seat increases their risk of injury or fatality in the event of a crash (Starnes, 2005).

Table 27
Children by Seating Position

Subgroup	(n)	(n) of Subgroup In Front Row	% of Subgroup In Front Row	Standard Error of the Percentage	Confidence Intervals	Design Effect
Unrestrained Children	112	24	22.4%	8.28%	4.3%, 40.4%	4.38
Children in Seat Belts	221	30	16.4%	6.28%	2.7%, 30.1%	6.33
Children in Car Seats/Booster Seats	3,817	45	1.0%	0.30%	0.3%, 1.6%	3.42

Unrestrained Children and Other Vehicle Occupants

Unrestrained children were compared to those riding in car seats/boosters and those restrained by seat belts only, with respect to the presence of an unrestrained driver and with respect to the total number of other vehicle occupants.

The 112 unrestrained children were more likely to ride with unrestrained drivers than those children who rode in car seats/boosters or were restrained by seat belts only (Second Order Rao-Scott chi-square: $F(1.10,13.20)=18.06$, $p < .05$, design correction=18.79), see Table 28. Based on the significant overall Second Order Rao-Scott chi-square F statistic, comparisons were made between cells.

Unrestrained children were also more likely to ride with unrestrained drivers than children who rode in car seats (Second Order Rao-Scott chi-square: $F(1,12)=18.89$, $p < .05$, design correction=36.06). Unrestrained children were also more likely to ride with unrestrained drivers than children who were restrained by seat belt only (Second Order Rao-Scott chi-square: $F(1,12)=39.82$, $p < .05$, design correction=2.92). Children in car seats and children restrained by seat belt only did not differ in their likelihood of riding with unrestrained drivers (Second Order Rao-Scott chi-square: $F(1,12)=1.81$, $p=0.20$, design correction=2.84).

Table 28
Unrestrained Drivers by Child Restraint Status

Subgroup	(n)	(n) of Subgroup Who Had Unrestrained Driver	% of Subgroup Who Had Unrestrained Driver	Standard Error of the Percentage	Confidence Intervals	Design Effect
Unrestrained Children	96	53	66.0%	7.46%	49.8%, 82.3%	2.36
Children in Seat Belts	179	10	5.7%	2.74%	0.0%, 11.6%	2.49
Children in Car Seats/Booster Seats	3,000	65	2.5%	0.64%	1.1%, 3.9%	5.03

The presence of other young children (under age 9) in the vehicle was not associated with a difference in restraint use. Differences in child restraint use were not significantly different relative to the number of children less than 9 years old in a vehicle. Where only one child under 9 was present in a vehicle, 1.4 percent of children were unrestrained (SE of percent=0.43%; 95% CI=0.5%, 2.3%; design effect=3.74) and where more than one child under 9 was present in a vehicle, 2.6 percent of children were unrestrained (SE of percent=0.68%; 95% CI=1.1%, 4.1%; design effect=2.41) (Second Order Rao-Scott chi-square: F(1.86, 22.26)=2.25, p = 0.13, design correction=2.19).

When vehicles held more total occupants of any age, young children were more likely to be unrestrained (see Table 29) (Second Order Rao-Scott chi-square: F(1.24,14.85)=7.45, p=0.01, design correction=6.70).

Table 29
Unrestrained Children by Other Vehicle Occupants

Subgroup	(n)	(n) of Subgroup Who Were Unrestrained	% of Subgroup Who Were Unrestrained	Standard Error of the Percentage	Confidence Intervals	Design Effect
Children riding with 3 or fewer total occupants	3,519	81	1.2%	0.37%	0.4%, 2.0%	4.21
Children riding with 4 or more total occupants	518	28	6.7%	1.92%	2.5%, 10.8%	3.05

Drivers of Unrestrained Children

When examining the drivers of unrestrained children, it is important to remember that there is substantial overlap with the category of unrestrained drivers. Demographic variables such as race and Hispanic ethnicity are likely to be highly related between the children and the drivers.

Demographic Characteristics of Drivers of Unrestrained Children

Male and female drivers did not differ significantly in their transportation of unrestrained children, see Table 30 (Second Order Rao-Scott chi-square: F(1.26,15.10)=2.54, p=0.13, design correction=3.74).

Table 30
Drivers of Unrestrained Children by Driver Gender

Subgroup	(n)	(n) of Subgroup Who Drove Unrestrained Children	% of Subgroup Who Drove Unrestrained Children	Standard Error of the Percentage	Confidence Intervals	Design Effect
Male Drivers	887	30	3.9%	1.22%	1.2%, 6.6%	3.53
Female Drivers	3,264	82	1.6%	0.50%	0.5%, 2.6%	5.26

Driver age was not related to the presence of an unrestrained sampled child. Driver age was recoded into three categories for the unrestrained drivers: over age 50, age 30 to 50, or under age 30, as shown in Table 31. The age groups did not differ in their restraint use (Second Order Rao-Scott chi-square: F(2.73,32.76)=1.21, p=0.32, design correction=1.69).

Table 31
Drivers of Unrestrained Children by Driver Age

Subgroup	(n)	(n) of Subgroup Who Drove Unrestrained Children	% of Subgroup Who Drove Unrestrained Children	Standard Error of the Percentage	Confidence Intervals	Design Effect
Under Age 30	802	18	1.7%	0.75%	0.1%, 3.3%	2.69
Age 30-50	2,757	47	1.0%	0.38%	0.2%, 1.8%	3.92
Over Age 50	291	13	2.7%	1.25%	0.0%, 5.4%	1.75

Hispanic and non-Hispanic drivers were significantly different; Hispanic drivers were more likely to travel with unrestrained children (see Table 32) (Second Order Rao-Scott chi-square: $F(1.25,14.96)=5.75$, $p < .05$, design correction=4.09).

Table 32
Drivers of Unrestrained Children by Driver Hispanic Background

Subgroup	(n)	(n) of Subgroup Who Drove Unrestrained Children	% of Subgroup Who Drove Unrestrained Children	Standard Error of the Percentage	Confidence Intervals	Design Effect
Hispanic Drivers	608	28	3.1%	0.79%	1.3%, 4.8%	1.28
Non-Hispanic Drivers	3,400	76	1.7%	0.57%	0.4%, 2.9%	6.82

Black drivers were more likely to transport unrestrained children than other drivers. Driver race was recoded into three groups (White, Black, and All Other Races), as shown in Table 33, in order to test for association and differences. Black drivers were more likely to have unrestrained children in their vehicles compared to White drivers and All Other Races (Second Order Rao-Scott chi-square: $F(1.60,19.25)=3.85$, $p < .05$, design correction=6.46). No unrestrained children were transported by Asian drivers. Particular caution must be used in the interpretation of these results, given that the sampling design was not geared toward the creation of representative groups.

Table 33
Drivers of Unrestrained Children by Driver Race

Subgroup	(n)	(n) of Subgroup Who Drove Unrestrained Children	% of Subgroup Who Drove Unrestrained Children	Standard Error of the Percentage	Confidence Intervals	Design Effect
Black Drivers	666	57	5.5%	2.74%	0.0%, 11.4%	9.67
White Drivers	3,040	38	0.9%	0.44%	0.0%, 1.9%	6.65
All Other Races	248	4	0.7%	0.40%	0.0%, 1.5%	0.58

Predictive Behaviors

Perceived Effectiveness of Car Seats

Drivers were asked, "In your opinion, how good are child safety seats at preventing injuries for children < 2 years old, when compared to using only a seat belt? How about 2- to 4-year-olds?" Responses were coded as: (1) "Not as good," (2) "The same," and (3) "Better than seat belts."

Drivers with unrestrained sampled children did not differ in their perception of car seat effectiveness for children under age 2 compared to drivers with restrained sampled children. There were 0.3 percent of drivers with unrestrained children (SE of percent=0.36%; 95% CI=0.0%, 1.2%; design effect=0.34) and 0.3 percent of drivers with children restrained in car seats or boosters (SE of percent=0.16%; 95% CI=0.0%, 0.6%; design effect=3.75) who reported that car seats are not as good as using only a seat belt for preventing injuries for children <2 years old (Second Order Rao-Scott chi-square: $F(2.03,24.31)=1.58$, $p=0.23$, design correction=1.50). That is, both groups apparently were aware of the benefits of car seats for restraining children. Both groups had under 1 percent believing that car seats are not as good as using only seat belts for preventing injuries to children.

Similarly, drivers with unrestrained sampled children did not differ in their perception of car seat effectiveness for children 2 to 4 years old compared to drivers with restrained sampled children; 0.3 percent (SE of percent=0.36%; 95% CI=0.0%, 1.1%; design effect=0.35) and 0.1 percent of drivers with children restrained in car seats or boosters (SE of percent=0.04%; 95% CI=0.0%, 0.2%; design effect=0.50) reported that car seats are not as good as using only seat belts for preventing injuries for children 2 to 4 years old (Second Order Rao-Scott chi-square: $F(1.09,13.07)=1.92$, $p=0.19$, design correction=16.15). That is, both groups apparently were aware of the benefits of car seats for restrain-

ing children. In both groups, less than 1 percent of drivers believed that car seats are not as good as using only seat belts for preventing injuries to children.

Drivers were also asked, "Using the same options as in the last question, in your opinion, how good are booster seats at preventing injuries for children 4 to 8 years old when compared to using only seat belts?"

Drivers with unrestrained sampled children also did not differ in their perception of booster seat effectiveness, compared to drivers with children riding in car seats or boosters. Proportions of responses from drivers with unrestrained children were not significantly different from those from drivers with children in car seats or boosters for the perceived effectiveness of car seats; 0.3 percent of drivers with unrestrained children (SE of percent=0.36%; 95% CI=0.0%, 1.1%; design effect=0.35) and 0.1 percent of drivers with children restrained in car seat or booster (SE of percent=0.04%; 95% CI=0.0%, 0.2%; design effect=0.50) reported that booster seats are not as good as using only seat belts for preventing injuries for children 4 to 8 years old (Second Order Rao-Scott chi-square: F(1.09,13.07)=1.92, p=0.19, design correction=16.15). That is, both groups apparently were aware of the benefits of booster seats for restraining children. In both groups, less than 1 percent of drivers believed that booster seats are not as good as using only seat belts for preventing injuries to children.

Information Sources

Drivers were asked, "Did you ever read or hear of any information or receive any advice about the need to use child safety seats from any of the following sources?" Interviewers read the options provided, and checked all of the options the driver selected. Options included the following:

- A doctor, nurse, or hospital personnel
- A book, magazine, or article
- Store (e.g., Babies R' Us)
- A daycare provider
- TV or radio
- A family member or friend
- A safety hotline
- The Internet
- Police or fire department
- Care class/car safety seat check station
- Other

Drivers who reported no information sources were more likely to have unrestrained children in the vehicle than drivers who reported one or more information sources (Second Order Rao-Scott chi-square: F(1.87,22.50)=3.70, $p < .05$, design correction=4.87). As shown in Table 34, drivers with no information sources were 350 percent more likely to drive with unrestrained children in the vehicles.

Table 34
Drivers of Unrestrained Children by Driver Information Source

Subgroup	(n)	(n) of Subgroup Who Drove Unrestrained Children	% of Subgroup Who Drove Unrestrained Children	Standard Error of the Percentage	Confidence Intervals	Design Effect
No Information Sources	533	21	3.5%	1.38%	0.5%, 6.5%	2.97
At Least One Information Source	3,397	53	1.0%	0.42%	0.1%, 1.9%	6.18

How can drivers avoid having information about car seat use? The list of possible information sources relies heavily on two factors: written material and civic engagement.

Written material requires basic literacy. Definitions of illiteracy vary, and measurement methods vary widely as well. However, 14 percent is a commonly cited adult illiteracy rate for the United States (Kutner, Greenberg, & Baer, 2006). Illiterate adults cannot be reached with written material.

The other frequent vector for information access is civic engagement. Interactions with police and/or fire departments, child care classes, safety hotlines, and even medical personnel all require interaction with public institutions. Some parents may avoid these information sources.

The lack of information access for drivers who did not mention information sources is associated with a 350 percent higher likelihood of unrestrained children. These hard-to-reach drivers cannot be ignored, and strategies for outreach should consider using communication methods that require neither literacy nor civic engagement.

Limitations

Causality cannot be inferred from this data. For example, we cannot conclude that loading a vehicle with more occupants *causes* children to ride unrestrained: we can only observe that the two are associated. Methodologically and statistically, causality cannot be determined.

Caution must be used when interpreting results. The sampling plan was designed to represent the restraint use of children under age 9. It was not designed to create a representative sample of racial, ethnic, or linguistic groups. Observers did not collect socioeconomic data, such as family income or education levels. Though results are reported here, interpretation should be made with awareness of these factors.

Sample sizes are small for many of the subgroups. As the subgroup sample size decreases, the confidence we have in our point estimates decreases. The corresponding weighted percentages may become less reliable (Greenwell, 2015), and conclusions become less advisable.

Implications

Black and Hispanic families are more likely to be unrestrained than other groups. Outreach efforts should continue to attempt to reach these groups.

The misperception that short trips are low-risk persists, with a short trip being the most commonly given reason for leaving a child unrestrained. This misperception should be amenable to continued outreach efforts.

An unrestrained child was more likely to ride in the front seat, to be in the charge of an unrestrained driver, and to be in a vehicle with four or more occupants. Outreach and enforcement efforts should continue to recognize that unrestrained children and unrestrained drivers often travel in the same vehicles, and continue to address the restraint use of all vehicle occupants.

Finally, drivers of unrestrained children were more likely to be uninformed about car seats, reporting zero sources of information about child safety seats. Efforts toward these hard-to-reach drivers should find modes of communication that do not require literacy or civic engagement.

References

Greenwell, N. K. (2015, May). *Results of the National Child Restraint Use Special Study* (Report No. DOT HS 812 142). Washington, DC: National Highway Traffic Safety Administration. Available at https://crashstats.nhtsa.dot.gov/Api/Public/ViewPublication/812142

Kutner, M., Greenberg, E., & Baer, J. (2006*). A first look at the literacy of America's adults in the 21st century* (National Center for Education Statistics Report No. NCES 2006-470). Washington, DC: Department of Education. Available at https://nces.ed.gov/NAAL/PDF/2006470.PDF

Pickrell, T. M., & Ye, T. J. (2013a, January). Occupant restraint use in 2011: Results from the National Occupant Protection Use Survey Controlled Intersection Study (Report No. DOT HS 811 697). Washington, DC: National Highway Traffic Safety Administration. Available at https://crashstats.nhtsa.dot.gov/Api/Public/ViewPublication/811697

Pickrell, T. M., & Ye, T. J. (2013b). *The 2011 National Survey of the Use of Booster Seats* (No. DOT HS 811 718). Washington, DC: National Highway Traffic Safety Administration. Available at https://crashstats.nhtsa.dot.gov/Api/Public/ViewPublication/811718

Starnes, M. (2005). *Child passenger fatalities and injuries, based on restraint use, vehicle type, seat position, and number of vehicles in the crash* (Report No. DOT HS 809 784). Washington, DC: National Highway Traffic Safety Administration. Available at https://crashstats.nhtsa.dot.gov/Api/Public/ViewPublication/809784

Suggested APA Format Citation:

Raymond, P., Searcy, S., Miller, S., & Redden, C. (2018, March). *Additional analysis of National Child Restraint Use Special Study: Characteristics of those not restrained* (Report No. DOT HS 812 477). Washington, DC: National Highway Traffic Safety Administration.

U.S. Department of Transportation

National Highway Traffic Safety Administration

This research note and other general information on highway traffic safety may be accessed by Internet users at: https://crashstats.nhtsa.dot.gov/.