

Traffic Safety Facts

Research Note

DOT HS 811 132

May 2009

Child Restraint Use in 2008 – Use of Correct Restraint Types

In 2008, the number of children younger than 1 year old or less than 20 pounds restrained in rear-facing child safety seats increased significantly. Rear-facing child safety seats are the appropriate child restraint for children younger than 1 year old or less than 20 pounds. This result is from the National Survey of the Use of Booster Seats (NSUBS), the only probability-based nationwide child restraint survey that observes restraint use and collects age, height, and weight information. The NSUBS is conducted by the National Center for Statistics and Analysis of the National Highway Traffic Safety Administration.

Although the primary purpose of the NSUBS is to estimate booster seat use, the survey also provides estimates of the extent to which children are “prematurely graduated” to restraint types that are inappropriate for their height or weight. We have found some improvements in the 2008 survey but we are still seeing evidence of premature graduation for all restraint types. In the following sections, we present the 2008 findings in three areas:

- Premature graduation out of rear-facing safety seats;
- Premature graduation out of front-facing safety seats; and
- Premature graduation into seat belts.

A review of child safety seats on the market finds a wide variation in height and weight limits. Many height limits range between 36 and 54 inches, and many weight limits range from 40 to 60 pounds. Thus we will consider these various limits in applying the NHTSA recommendation to assess the survey results.

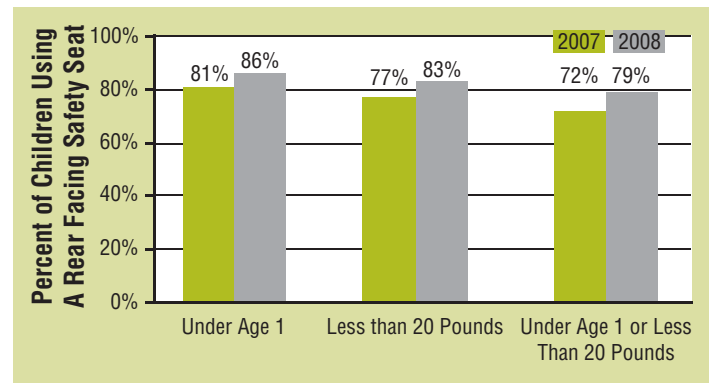
Premature Graduation Out of Rear-Facing Safety Seats

NHTSA recommends that for the best possible protection, infants should be kept in the back seat, in rear-

facing child safety seats, as long as possible up to the height or weight limit of the particular seat. At a minimum, infants should be kept facing the rear until a minimum of age 1 and at least 20 pounds (source: www.nhtsa.gov).

The good news from the 2008 NSUBS survey is that more children were restrained in rear-facing child safety seats in 2008 than in 2007 and these increases are statistically significant.

Rear-Facing Child Safety Seat Use



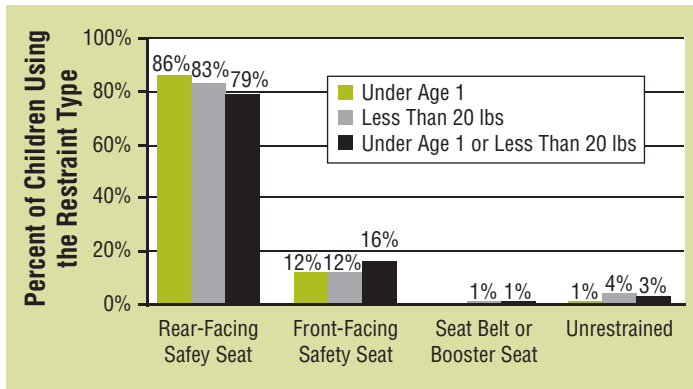
Source: The National Survey of the Use of Booster Seats, 2007-2008, NHTSA, National Center for Statistics and Analysis

However, the 2008 NSUBS found that

- About 14% of children under age 1 were not in rear-facing seats in 2008 (19% in 2007).
- About 17% of children less than 20 pounds were not in rear-facing seats in 2008 (23% in 2007).
- About 21% of children who are under age 1 or less than 20 pounds were not in rear-facing seats in 2008 (28% in 2007).

Most of the premature graduation for these children was to front-facing safety seats.

Distribution of Restraint Types in 2008



Note: Percentages may not total to 100 percent due to rounding
 Source: The National Survey of the Use of Booster Seats, NHTSA, National Center for Statistics and Analysis, 2008

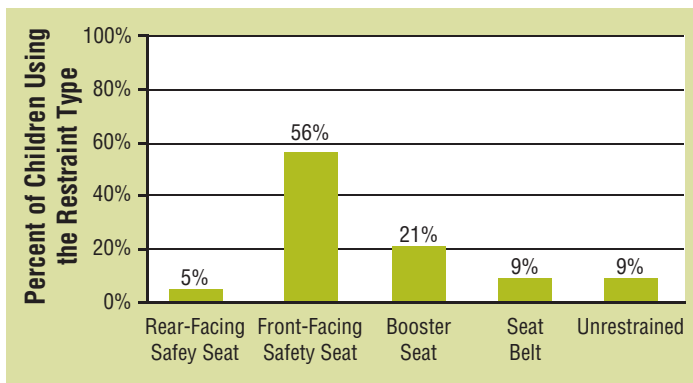
Premature Graduation Out of Front-Facing Safety Seats

NHTSA recommends that when children outgrow their rear-facing seats (at a minimum age 1 **and** at least 20 pounds, *but preferably not until they have reached the manufacturer's height or weight limit*) they should ride in forward-facing child safety seats, in the back seat, until they reach the upper weight or height limit of the particular seat (usually at around age 4 and 40 pounds). (Source: www.nhtsa.gov)

The 2008 NSUBS found that:

- 44% of children who are 20 to 40 pounds were not in front-facing safety seats in 2008 (44% in 2007). Note, however, that some 20- to 40-pound children could be infants who should be in rear-facing safety seats, and note that some booster seats have weight limits as low as 30 pounds.

Distribution of Restraint Types in 2008 for Children Age 0–12 Who Were 20–40 lbs



Source: The National Survey of the Use of Booster Seats 2008, NHTSA, National Center for Statistics and Analysis

Premature Graduation to Seat Belts

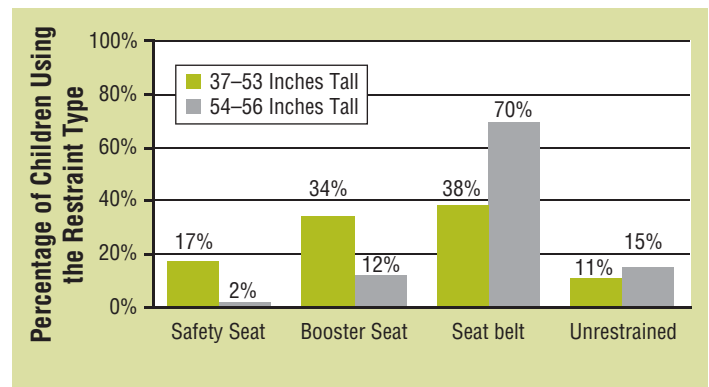
NHTSA recommends that once children outgrow their forward-facing seats (usually at around age 4 and 40 pounds), they should ride in booster seats, in the back seat, until the vehicle seat belts fit properly. Seat belts fit properly when the lap belt lays across the upper thighs and the shoulder belt fits across the chest (usually at age 8 or when they are 4'9" tall). (Source: www.nhtsa.gov)

However, the 2008 NSUBS found that:

- 49% of children age 0 to 12 who are 37 to 53 inches tall were **either unrestrained or prematurely graduated to seat belts in 2008** (56% in 2007).
- 85% of children up to 12 who are 54 to 56 inches tall were **either unrestrained or prematurely graduated to seat belts in 2008** (86% in 2007). Note however that these children are within 2 inches of the 4'9" recommendation.

Many of these children were in seat belts and a fair number were unrestrained.

Distribution of Restraint Types in 2008 for Children Age 0–12 Who Were 37–56 Inches Tall



Note: Percentages may not total to 100 percent due to rounding
 Source: The National Survey of the Use of Booster Seats 2008, NHTSA, National Center for Statistics and Analysis

The Types of Restraints Used by Children 0–12 Years Old, by Weight

Restraint Type ¹	2007		2008		2007–2008 Change	
	Percentage ² of Children ³ Observed Using the Restraint Type	Standard Error	Percentage ² of Children ³ Observed Using the Restraint Type	Standard Error	Change in Percentage Points	Confidence in a Change in Percentage ⁴
Children Who Weigh Less Than 20 Pounds						
Rear-Facing Child Safety Seat	77%	6%	83%	7%	6	84%
Front-Facing Child Safety Seat	19%	7%	12%	3%	-7	78%
High-Backed Booster Seat	NA	NA	NA	NA	NA	NA
Backless Booster Seat	NA	NA	NA	NA	NA	NA
Seat Belt	NA	NA	NA	NA	NA	NA
No Restraint Observed	1%	1%	4%	5%	3	53%
Children Who Weigh Between 20 and 40 Pounds						
Rear-Facing Child Safety Seat	5%	1%	5%	2%	0	0%
Front-Facing Child Safety Seat	56%	5%	56%	5%	0	4%
High-Backed Booster Seat	14%	2%	15%	3%	1	31%
Backless Booster Seat	7%	1%	6%	1%	-1	58%
Seat Belt	10%	3%	9%	3%	-1	31%
No Restraint Observed	8%	3%	9%	1%	1	23%
Children Who Weigh Between 41 and 60 Pounds						
Rear-Facing Child Safety Seat	NA	NA	NA	NA	NA	NA
Front-Facing Child Safety Seat	10%	2%	8%	2%	-2	98%
High-Backed Booster Seat	17%	3%	23%	2%	6	89%
Backless Booster Seat	15%	3%	17%	3%	2	51%
Seat Belt	43%	4%	42%	4%	-1	14%
No Restraint Observed	14%	4%	10%	2%	-4	77%
Children Who Weigh More Than 60 Pounds						
Rear-Facing Child Safety Seat	NA	NA	NA	NA	NA	NA
Front-Facing Child Safety Seat	1%	1%	2%	1%	1	49%
High-Backed Booster Seat	2%	1%	3%	1%	1	36%
Backless Booster Seat	3%	1%	4%	1%	1	83%
Seat Belt	77%	3%	75%	3%	-2	25%
No Restraint Observed	17%	3%	16%	3%	-1	28%

¹ Survey data was obtained on children age 0 to 12 in passenger vehicles at a nationwide probability sample of gas stations, day care centers, recreation centers, and restaurants in five fast-food chains.

² Estimates might not sum to totals due to rounding.

³ Restraint use is observed by trained data collectors prior to or just as the vehicle comes to a stop, except in the case of observation at fast-food drive-through lanes, where restraint use is observed prior to the vehicle reaching the drive-through window.

⁴ The degree of statistical confidence that the 2008 use rate is different from the 2007 rate. Confidence levels that meet or exceed 90 percent are formatted in boldface type.

NA: Data not sufficient to produce a reliable estimate.

Source: The National Survey of the Use of Booster Seats, NHTSA, National Center for Statistics and Analysis

The Types of Restraints Used by Children 0–12 Years Old, by Height

Restraint Type ¹	2007		2008		2007–2008 Change	
	Percentage ² of Children ³ Observed Using the Restraint Type	Standard Error	Percentage ² of Children ³ Observed Using the Restraint Type	Standard Error	Change in Percentage Points	Confidence in a Change in Percentage ⁴
Children Who Are at Most 36 Inches Tall						
Rear-Facing Child Safety Seat	12%	2%	16%	4%	4	72%
Front-Facing Child Safety Seat	55%	5%	55%	3%	0	12%
High-Backed Booster Seat	11%	2%	10%	2%	-1	20%
Backless Booster Seat	5%	1%	4%	1%	-1	66%
Seat Belt	11%	6%	7%	2%	-4	57%
No Restraint Observed	6%	2%	8%	2%	2	81%
Children Who Are Between 37 and 53 Inches Tall						
Rear-Facing Child Safety Seat	NA	NA	0%	0%	NA	NA
Front-Facing Child Safety Seat	15%	3%	17%	4%	2	65%
High-Backed Booster Seat	17%	3%	21%	2%	4	77%
Backless Booster Seat	12%	2%	13%	2%	1	40%
Seat Belt	40%	4%	38%	4%	-2	37%
No Restraint Observed	16%	5%	11%	2%	-5	75%
Children Who Are Between 54 and 56 Inches Tall						
Rear-Facing Child Safety Seat	NA	NA	NA	NA	NA	NA
Front-Facing Child Safety Seat	3%	2%	2%	1%	-1	61%
High-Backed Booster Seat	3%	2%	4%	2%	1	37%
Backless Booster Seat	8%	2%	8%	3%	0	12%
Seat Belt	71%	4%	70%	5%	-1	14%
No Restraint Observed	15%	4%	15%	4%	0	8%
Children Who Are Taller Than 56 Inches						
Rear-Facing Child Safety Seat	NA	NA	NA	NA	NA	NA
Front-Facing Child Safety Seat	NA	NA	0%	0%	NA	NA
High-Backed Booster Seat	1%	1%	2%	1%	1	35%
Backless Booster Seat	3%	2%	1%	1%	-2	64%
Seat Belt	83%	4%	81%	2%	-2	35%
No Restraint Observed	13%	2%	16%	2%	3	76%

¹ Survey data was obtained on children age 0 to 12 in passenger vehicles at a nationwide probability sample of gas stations, day care centers, recreation centers, and restaurants in five fast-food chains.

² Estimates might not sum to totals due to rounding.

³ Restraint use is observed by trained data collectors prior to or just as the vehicle comes to a stop, except in the case of observation at fast-food drive-through lanes, where restraint use is observed prior to the vehicle reaching the drive-through window.

⁴ The degree of statistical confidence that the 2008 use rate is different from the 2007 rate. Confidence levels that meet or exceed 90% are formatted in boldface type.

NA: Data not sufficient to produce a reliable estimate.

Source: The National Survey of the Use of Booster Seats, National Highway Traffic Safety Administration, National Center for Statistics and Analysis

The Types of Restraints Used Children 0–12 Years Old, by Age

Restraint Type ¹	2007		2008		2007–2008 Change	
	Percentage ² of Children ³ Observed Using the Restraint Type	Standard Error	Percentage ² of Children ³ Observed Using the Restraint Type	Standard Error	Change in Percentage Points	Confidence in a Change in Percentage ⁴
Children Less Than 1 Year Old						
Rear-Facing Child Safety Seat	81%	4%	86%	5%	5	94%
Front-Facing Child Safety Seat	14%	2%	12%	5%	-2	34%
High-Backed Booster Seat	NA	NA	NA	NA	NA	NA
Backless Booster Seat	NA	NA	NA	NA	NA	NA
Seat Belt	NA	NA	NA	NA	NA	NA
No Restraint Observed	2%	1%	1%	1%	-1	51%
Children Age 1–3 Years						
Rear-Facing Child Safety Seat	3%	1%	2%	1%	-1	53%
Front-Facing Child Safety Seat	73%	4%	72%	7%	-1	11%
High-Backed Booster Seat	9%	2%	11%	4%	2	33%
Backless Booster Seat	5%	1%	3%	1%	-2	84%
Seat Belt	6%	3%	4%	2%	-2	44%
No Restraint Observed	4%	2%	8%	2%	4	100%
Children Age 4–7 Years						
Rear-Facing Child Safety Seat	NA	NA	NA	NA	NA	NA
Front-Facing Child Safety Seat	13%	3%	12%	3%	-1	48%
High-Backed Booster Seat	22%	4%	26%	3%	4	71%
Backless Booster Seat	15%	2%	17%	2%	2	69%
Seat Belt	35%	4%	34%	5%	-1	17%
No Restraint Observed	15%	4%	11%	1%	-4	68%
Children Age 8–12 Years						
Rear-Facing Child Safety Seat	NA	NA	NA	NA	NA	NA
Front-Facing Child Safety Seat	1%	0%	1%	1%	0	96%
High-Backed Booster Seat	2%	1%	2%	1%	0	72%
Backless Booster Seat	3%	1%	3%	1%	0	13%
Seat Belt	77%	4%	78%	3%	1	23%
No Restraint Observed	17%	4%	15%	3%	-2	49%

¹ Survey data was obtained on children age 0 to 12 in passenger vehicles at a nationwide probability sample of gas stations, day care centers, recreation centers, and restaurants in five fast-food chains.

² Estimates might not sum to totals due to rounding.

³ Restraint use is observed by trained data collectors prior to or just as the vehicle comes to a stop, except in the case of observation at fast-food drive-through lanes, where restraint use is observed prior to the vehicle reaching the drive-through window.

⁴ The degree of statistical confidence that the 2008 use rate is different from the 2007 rate. Confidence levels that meet or exceed 90% are formatted in boldface type.

NA: Data not sufficient to produce a reliable estimate.

Source: The National Survey of the Use of Booster Seats, National Highway Traffic Safety Administration, National Center for Statistics and Analysis

Survey Methodology

The National Survey of the Use of Booster Seats obtains its data by sending trained data collectors to a probability sample of gas stations, day care centers, recreation centers, and restaurants in five national fast-food chains across the United States. The choice of these types of data collection sites stems from the necessity of observing restraint use from a close range in a slow-moving or stopped vehicle (as is required in order to distinguish a seat belt being used in conjunction with a backless booster seat from a seat belt being used alone), combined with the desire to capture large numbers of children.

Data collectors approach passenger vehicles appearing to have child occupants under the age of 13, observe the restraint use of up to nine occupants in the first three rows of seats and conduct interviews to obtain the race and ethnicity of all occupants (obtained in compliance with OMB standards for such data) and the heights, weights, and ages of child occupants appearing to be under age 13. (The approximate ages of other occupants (expressed as an age range, such as 16 to 24 years old), and the genders of all occupants, are subjectively assessed by the data collectors.)

In order to capture restraint usage before children unfasten the restraints, restraint use is observed by the data collectors prior to or just as the vehicle comes to a stop, except in the case of observation at fast-food drive-through lanes, where restraint use is observed prior to the vehicle reaching the drive-through window.

In order to reach as wide an audience as possible, the NSUBS uses some Spanish-speaking data collectors.

Sites, Vehicles, Occupants, and Children 0–12 Years in NSUBS

Numbers of	2007	2008	Percentage Change
Data Collection Sites	430	440	3%
Vehicles Observed	4,800	6,200	29%
Occupants Observed	14,000	18,000	29%
Children Age 0-12 Observed	7,500	9,700	29%
Children Age 0-12 Interviewed*	6,600	7,600	15%

* Data obtained by interview with an adult occupant.

The 2008 NSUBS survey data is based on the observation of 18,000 occupants, 9,700 of whom were under age 13, in 6,200 vehicles at 45 day care centers, 142 fast food restaurants, 209 gas stations, and 45 recreation centers

nationwide. The survey interviews covered 7,632 children under age 13, including 412 infants under 1 year old, 1,795 children 1- to 3 years old, 2,905 children 4 to 7 years old, and 2,520 children 8 to 12 years old. The data was collected between July 17 and July 31, 2008 while the 2007 data was collected between July 19 and August 2, 2007.

The NSUBS uses a complex multistage probability sample, statistical data editing, imputation of unknown values, and complex estimation and variance estimation procedures. See the NHTSA Technical Report referenced below for more information on these procedures, as well as for more information on the survey's data collection protocols.

The design of the survey, survey preparation activities, data collection, estimation, and variance estimation for the NSUBS were conducted by Westat, Inc., under the direction of the National Center for Statistics and Analysis in NHTSA under Federal contract number DTNH22-07-D-00057. The OMB clearance number for the NSUBS is 2127-0644.

What Do the Survey Results Tell Us? Are the Results Representative?

By design and necessity, the NSUBS survey data is obtained from a restricted set of site types, namely gas stations, day care centers, recreation centers, and restaurants in five fast-food chains. However the survey uses a probability sample of these site types, and so its results are representative of children who frequent these types of sites.

For instance, the survey result that 38 percent of children between 37 and 53 inches tall were in seat belts means that among children in this height range who were taken by passenger vehicles to gas stations, day care centers, recreation centers, and fast-food restaurants in 2008, 38 percent were in seat belts. Whether or not the seat belt use rate for children in this height range who do not frequent these site types is higher or lower is an open question, and not one that the NSUBS (or any other available survey) can answer.

How Do These Results Compare With NOPUS?

NHTSA conducts another survey, the National Occupant Protection Use Survey (NOPUS), which examines some aspects of premature graduation. The NOPUS observes children in vehicles stopped at stop signs and stop lights on a probability sample of roadways, and, as necessitated by roadside observation,

assesses age subjectively, does not collect height or weight, and its data collectors do not attempt to decipher whether a child in a shoulder belt is in a backless booster seat. Thus the NOPUS is conducted at a set of sites that is representative of U.S. roadways, but its age data is subject to observer misjudgment, its restraint type data is less complete, and it cannot provide restraint use distributions by height or weight.

The restraint use distributions NOPUS can provide (the distributions by age) are sometimes comparable to those in NSUBS, and sometimes not. Differences between the NOPUS and NSUBS estimates could be due to the different populations of vehicles captured by the two surveys (stemming from the different site types used) and/or different sources of age information (which is visually estimated in NOPUS versus obtained by interview in NSUBS). For more information on the NOPUS data, see the publication “Child Restraint Use in 2007” available at <http://www-nrd.nhtsa.dot.gov/CMSWeb/ViewCatalogbyCategory.aspx>.

Restraint Types and Definition of Use

The NSUBS uses the following definitions of restraint use:

Rear-Facing Child Safety Seat – The child occupant is in a seat that sits on top of the vehicle seat in such a way that the child faces the rear of the vehicle, and the harness straps are across the child’s front. The harness straps might be secured or not.

Front-Facing Child Safety Seat – The child occupant is in a seat that sits on top of the vehicle seat in such a way that the child faces the front of the vehicle, and with harness straps that are across the child’s front.

High-Backed Booster Seat – The child occupant is in a seat with a seat back that sits on top of the vehicle seat, and has a seat belt across the front of the child’s body, whether lap or lap/shoulder. No harness is in use.

Backless Booster Seat – The child occupant is sitting on a platform with no seat back that sits on top of the vehicle seat, and has a seat belt across the front of the child’s body, whether lap or lap/shoulder. No harness is in use.

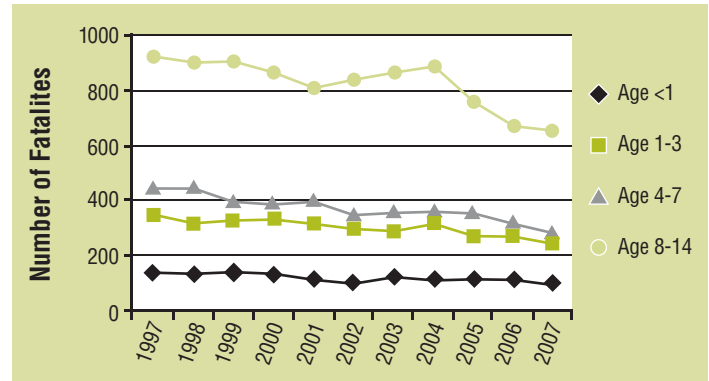
Seat Belt – Child (or adult) is sitting on the vehicle seat and the seat belt is across front of the body (includes lap belts).

Unrestrained – All other cases

Progress in Reducing Child Fatalities

We note that child occupant fatalities have declined in the past decade, as demonstrated by NHTSA’s Fatality Analysis Reporting System (FARS). Booster seats, child safety seats, and seat belts provide key tools to achieve further fatality reductions.

Occupant Fatalities Among Children 14 and Under by Age Groups, 1997–2007



Source: Fatality Analysis Reporting System (FARS), NHTSA’s National Center for Statistics and Analysis, 1997-2007

For More Information

This Research Note was written by Timothy M. Pickrell, a mathematical statistician in the Mathematical Analysis Division, National Center for Statistics and Analysis, NHTSA, and by Tony Jianqiang Ye, a contractor employed by URC Enterprises, working with the Mathematical Analysis Division, National Center for Statistics and Analysis, NHTSA. For questions regarding the information presented in this document, please contact timothy.pickrell@dot.gov.

The NSUBS provides a rich data source for information on the restraint use of children under age 13. In particular, the NSUBS provides the agency’s estimate of booster seat use among 4- to 7-year-olds and provides data on child restraint use by race and ethnicity. This publication is part of a series that presents overall results from the survey on these topics. Please see the companion publications “Booster Seat Use in 2008” and “Child Restraint Use in 2008—Demographic Results” for the latest data on these topics. Detailed information on the NSUBS survey design and analysis procedures are provided in the NHTSA Technical Report “The 2006 National Survey of the Use of Booster Seats—Methodology Report.” These publications will be available at the Web site <http://www-nrd.nhtsa.dot.gov/CMSWeb/ViewCatalogbyCategory.aspx> in 2009.

For more information on NHTSA's recommended child restraint types for children of various heights and weights, and for information on the campaign by NHTSA to increase child restraint use, see www.nhtsa.gov.



U.S. Department
of Transportation

**National Highway
Traffic Safety
Administration**