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Restraint System Usage in the Traffic Population

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<p>16. Abstract This report presents findings from four independent studies on occupant restraint use for various segments of the traffic population. Field observations, collected in 19 U.S. cities from November, 1982 through December, 1983, are the basis for this report. The four studies and their findings are as follows:</p> <ol style="list-style-type: none"> 1. <u>Driver Safety Belt Use:</u> A total of 146,305 drivers stopped for traffic signals were observed during the 14 month period. 14.0 percent were observed to wear safety belts. 2. <u>Passenger Safety Belt and Child Safety Seat Use:</u> Findings from this study are based on 114,470 passengers observed at shopping mall entrances and exits. For infants and toddlers, child safety seat usage was observed to be 60.4 and 37.8 percent, respectively. The percent of subteens wearing safety belts was observed to be 8.6 percent while teens and adults were observed wearing safety belts in 7.0 and 10.5 percent of the observations, respectively. 3. <u>Safety Seat Installation Characteristics:</u> Observations were recorded on a total of 3,518 child safety seats in vehicles parked at shopping malls and 83.3 percent were observed in the toddler mode. Seat belts were installed incorrectly in approximately 34 percent of toddler seat observations. For toddler seats that required tethering and belting, tethers were not used or used incorrectly in approximately 80 percent of the observations. 4. <u>Helmet Use by Operators and Passengers of Motorcycles and Mopeds:</u> Driver and passenger helmet use was observed to be 66.6 and 61.2 percent, respectively, for 21,414 motorcycle observations. Moped observations totalled 1,793 and helmet use among drivers and passengers was observed to be 34.7 and 26.2 percent, respectively. 			
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METRIC CONVERSION FACTORS

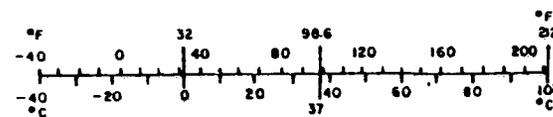
Approximate Conversions to Metric Measures

Symbol	When You Know	Multiply by	To Find	Symbol
LENGTH				
in	inches	2.5	centimeters	cm
ft	feet	30	centimeters	cm
yd	yards	0.9	meters	m
mi	miles	1.6	kilometers	km
AREA				
in ²	square inches	6.5	square centimeters	cm ²
ft ²	square feet	0.89	square meters	m ²
yd ²	square yards	0.8	square meters	m ²
mi ²	square miles	2.6	square kilometers	km ²
	acres	0.4	hectares	ha
MASS (weight)				
oz	ounces	28	grams	g
lb	pounds	0.45	kilograms	kg
	short tons (2000 lb)	0.9	tonnes	t
VOLUME				
tsp	teaspoons	5	milliliters	ml
Tbsp	tablespoons	15	milliliters	ml
fl oz	fluid ounces	30	milliliters	ml
c	cups	0.24	liters	l
pt	pints	0.47	liters	l
qt	quarts	0.95	liters	l
gal	gallons	3.8	liters	l
ft ³	cubic feet	0.03	cubic meters	m ³
yd ³	cubic yards	0.76	cubic meters	m ³
TEMPERATURE (exact)				
°F	Fahrenheit temperature	5/9 (after subtracting 32)	Celsius temperature	°C



Approximate Conversions from Metric Measures

Symbol	When You Know	Multiply by	To Find	Symbol
LENGTH				
mm	millimeters	0.04	inches	in
cm	centimeters	0.4	inches	in
m	meters	3.3	feet	ft
m	meters	1.1	yards	yd
km	kilometers	0.6	miles	mi
AREA				
cm ²	square centimeters	0.16	square inches	in ²
m ²	square meters	1.2	square yards	yd ²
km ²	square kilometers	0.4	square miles	mi ²
ha	hectares (10,000 m ²)	2.5	acres	
MASS (weight)				
g	grams	0.035	ounces	oz
kg	kilograms	2.2	pounds	lb
t	tonnes (1000 kg)	1.1	short tons	
VOLUME				
ml	milliliters	0.03	fluid ounces	fl oz
l	liters	2.1	pints	pt
l	liters	1.06	quarts	qt
l	liters	0.26	gallons	gal
m ³	cubic meters	36	cubic feet	ft ³
m ³	cubic meters	1.3	cubic yards	yd ³
TEMPERATURE (exact)				
°C	Celsius temperature	9/5 (then add 32)	Fahrenheit temperature	°F



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SUMMARY

Four observational studies for various segments of the traffic population are currently being conducted in 19 cities throughout the nation on a quarterly basis. Data obtained through daytime observations at approximately 30 traffic intersections and 3 major shopping centers in each city are used to: (1) determine the extent to which drivers of automobiles wear safety belts; (2) determine the use of safety belts and child safety seats by passengers of automobiles; (3) determine safety seat installation characteristics; and (4) determine the extent to which helmets are used by operators and passengers of motorcycles and mopeds.

This report documents the procedures used to conduct the observational studies and the study findings for the period November, 1982 through December, 1983.

Driver Study Findings

Based on a total of 146,305 observations of drivers stopped for traffic signals, 14.0 percent of the drivers were observed to wear safety belts. The following are major findings associated with driver safety belt usage:

- Driver safety belt usage increased as vehicle model year increased.
- Drivers of imported vehicles were observed to have higher safety belt usage rates than drivers of domestic vehicles.
- Driver safety belt usage increased as vehicle size decreased.
- Female drivers consistently experienced higher safety belt usage rates than male drivers.
- Driver safety belt usage was observed to be highest among the 25 to 49 year age group.
- Driver safety belt usage in the West region was consistently higher than in any other region.

Passenger Study Findings

A total of 114,470 passengers were observed at shopping mall entrances/exits during a separate study. For infant passengers under the age of 1 year, 60.4 percent were observed in child safety seats. For toddlers between the ages of 1 and 4, 37.8 percent were observed in either approved toddler or booster seats. Overall, 40.5 percent of children 4 years of age and under were observed in child safety seats and approximately one-fourth of these children were not harnessed. Subteens between the ages of 5 to 12 years were observed to wear safety belts in 8.6 percent of the observations while teens and adults exhibited usage rates of 7.0 and 10.5 percent, respectively.

Safety Seat Installation Findings

A total of 3,518 safety seats were observed in vehicles parked at shopping malls. Seats installed in the infant mode were observed in 483 of the observations while 2,932 seats were observed in the toddler mode. The remaining 103 observations involved booster seats. For toddler seats that require installation using only the vehicle safety belt, 57.4 percent appeared to be installed properly and seat belts were used incorrectly in 31.7 percent of the observations. For toddler seats that require belting and tethering, only 15.3 percent were observed to be correctly installed. Tethers were not used or used incorrectly in approximately 80 percent of observations. Incorrect belting was similar (37.7 percent) to that observed for the "belt-only" seats.

Helmet Study Findings

Of the 21,414 motorcycle observations, driver and passenger helmet use was observed to be 66.6 and 61.2 percent, respectively. Helmet use for drivers and passengers of 1,793 moped observations was observed to be 34.7 and 26.2 percent, respectively.

INTRODUCTION

This report presents the annual findings of the study, Restraint System Usage in the Traffic Population. The report is based on field observations collected over a 14-month period from November, 1982 through December, 1983. During this period the use of occupant restraints including both safety belts and child safety seats was observed for over 260,000 drivers and passengers in over 222,000 passenger vehicles in 19 cities across the nation. Also during this time, helmet usage was recorded for operators and passengers of over 21,000 motorcycles.

Study Objective

The objective of this study is to observe, record, and report the use of occupant restraints and motorcycle helmets in 19 cities throughout the country.

Study Description

The study consisted of conducting four independent studies on occupant restraint use for various segments of the traffic population. The studies are: (1) driver safety belt use; (2) passenger safety belt and child safety seat use; (3) installation characteristics of child safety seats; and (4) helmet use by operators and passengers of motorcycles and mopeds. Each observational study is described below.

Drivers in the Traffic Population (Driver Study)

The purpose of this study is to monitor the use of safety belts by drivers of privately-owned passenger cars at designated intersection and freeway exit locations. The data collected for each vehicle and driver are:

- License plate number
- Make/model of car
- Estimated age of driver and passengers
- Driver sex
- Observed driver safety belt usage
- The presence of automatic safety belts
- Seating position of passengers

Passengers in the Traffic Population (Passenger Study)

The purpose of this study is to monitor the use of occupant restraint systems by passengers of private passenger cars at exits/entrances of selected shopping malls. Special emphasis is placed on observing child safety seat use by infants (less than 1 year of age) and toddlers (ages 1 to 4). The data collected for each passenger are:

- Estimated age.
- Seating position.
- Occupant restraint system used by each passenger.
- Safety seat usage characteristics for infants and toddlers.

Installation Characteristics of Child Safety Seats (Parking Lot Study)

This study consists of observing infant, toddler and booster safety seats in parked cars located in shopping centers to obtain more detailed information on the installation of child safety seats in automobiles. The data collected in this study element are:

- Position of safety seat in vehicle.
- Tether usage (for toddler seats that require the use of tethers).
- Belt usage (for toddler seats that require that the lap belt be attached to the undercarriage of the toddler seat).
- Shield requirement on toddler seats (if the seat is a shield-type toddler seat).
- Toddler safety seat model (type of seat).
- Infant safety seat model (type of seat).

Motorcycle/Moped Operators in the Traffic Population (Helmet Study)

The purpose of this study element is to monitor the use of helmets by operators and passengers of motorcycles and mopeds observed on the roadways.

METHODOLOGY

This study is a continuation of earlier studies conducted for the National Highway Traffic Safety Administration (NHTSA). In the current study, data are to be collected over a 24-month period from November, 1982 through October, 1984 in the same 19 cities that were used in the previous study.

The major elements of the study methodology are listed below and described in the following sections.

- Develop observation and training procedures.
- Train observers and supervisors.
- Collect data.
- Analyze data.

Observation and Training Procedures

At the outset of the study, plans were established for implementing the 24-month data collection effort. This involved the development of a data collection plan and training procedure for field personnel.

Data Collection Plan

The primary objective of the data collection plan was to achieve maximum consistency between the current and previous study. Therefore, the cities, data collection sites, and data collection procedures that were used in the previous study were adopted or used as a foundation in the current effort.

Data Collection Sites

The 19 cities in which data are currently collected are identical to those used in the previous study. The cities and corresponding data collection regions are listed below and shown geographically on Figure 1.

New England Region

Boston, MA
Providence, RI

Mid-Atlantic Region

New York, NY
Baltimore, MD
Pittsburgh, PA

Southeast Region

Atlanta, GA
Miami, FL
Birmingham, AL
New Orleans, LA

Southwest Region

Houston, TX
Dallas, TX

Northcentral Region

Minneapolis-St. Paul, MN
Chicago, IL
Fargo, ND-Moorhead, MN

West Region

Seattle, WA
San Francisco, CA
San Diego, CA
Phoenix, AZ
Los Angeles, CA

The 19 cities selected for this study are from each geographical region of the country and provide a variety of climate and driving conditions. These cities are not considered a nationally representative sample of all U.S. cities. They were purposively selected to provide long term, cost-effective trend data. The same cities and sites within each city have been used since 1974 in successive observations.

Data Collection Schedule

Initially, data collection schedules were established in strict conformance to the previous NHTSA studies. However, changes were made in response to new data reporting requirements.

The current schedule is based on the requirement to complete data collection activities at all sites in all cities during a 3-month period. To achieve this, 5 cities are completed each month along with 5 partially completed cities (approximately one-third of the partial cities are completed each month).

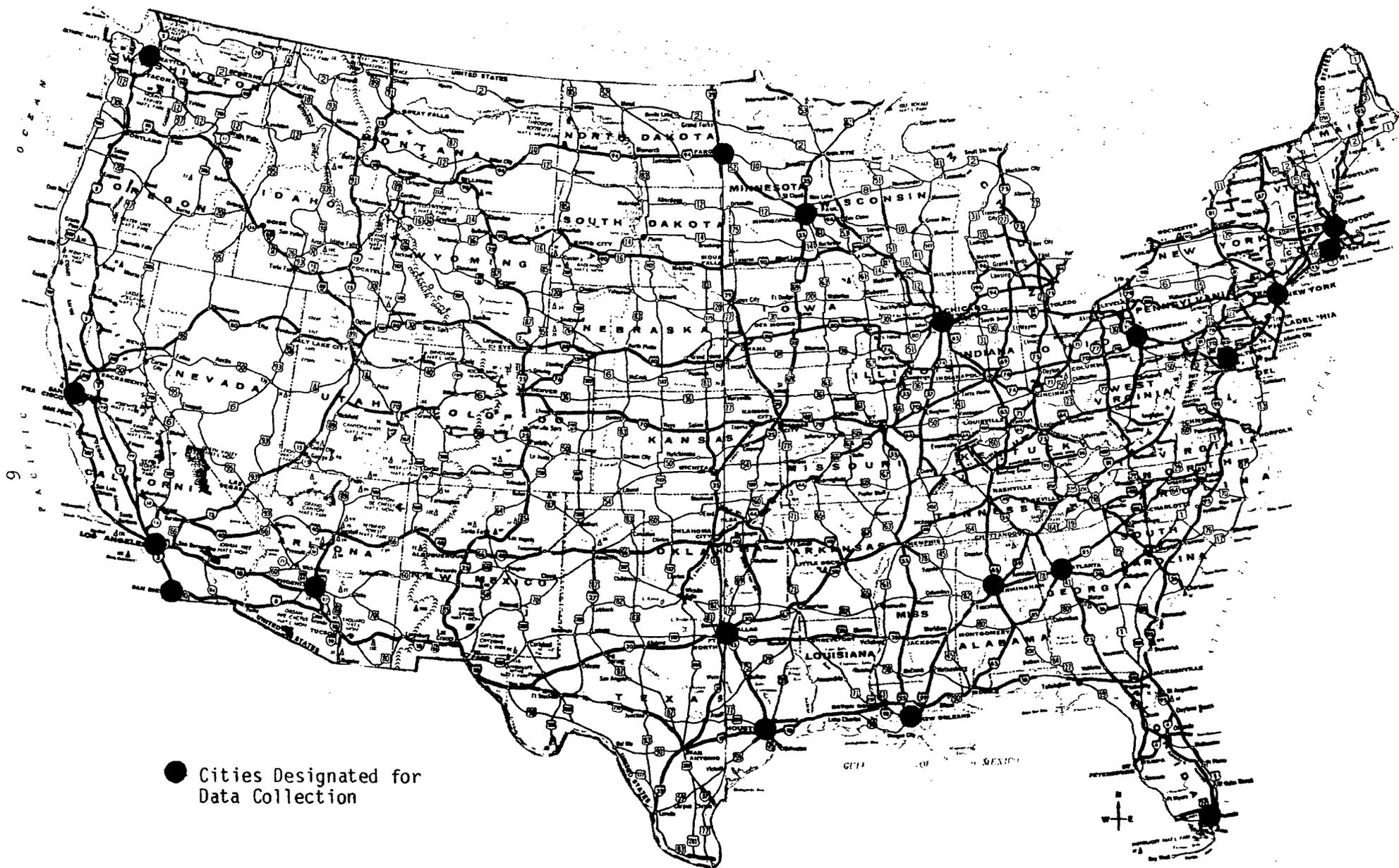


Figure 1. Location of the 19 cities for restraint usage observation.

Each city requires approximately 13.5 days of data collection for completion, consisting of approximately 7.5 days of driver study and 6 days of passenger study. Helmet study observations are recorded throughout the data collection stay as motorcycles and mopeds are observed.

The sites used for data collection in the driver study are primary road intersections and freeway exits. The sites were selected to be representative of a city as practically possible within self-imposed constraints. The sites were originally selected by Opinion Research Corporation (1) in an earlier study by a selection process that involved subdividing each city area (the corporate city, along with the contiguous suburban area) into a series of grids. The square grids were classified as being one of three groups: (1) squares in open country areas containing few or no primary road intersections; (2) squares containing one or more freeway exits; and (3) squares containing primary roads but no freeway exits.

Those squares in group 1 were not selected for sampling purposes. The squares in groups 2 and 3 were used to randomly select 22 primary road squares and 11 freeway squares. This stratification process was used to ensure that two different types of traffic would be sampled (i.e., high speed freeway traffic and slower speed arterial traffic).

For each of the selected 22 primary and 11 freeway grids, a list of 10 sites from randomly selected, controlled intersections were given to the observer. On the first trip to the city, the observer went to the first site listed within his pre-assigned grid. If the site was suitable for safety belt observation (i.e., a curb to stand on, sufficient traffic, safety for the observer, no construction, etc.), this site was used to represent the grid and the other sites were not used. If the first site on the list was unacceptable for safety belt observation, the observer would go to the next site on the list and repeat the process until an acceptable site was found.

In the current study, data are collected at 30 driver study sites (70 percent arterial and 30 percent freeway exit) in each city. In addition, 3 passenger study locations (shopping malls) were selected within each city by Opinion Research Corporation (1) and are used in the present study. These malls were originally selected to provide a mix of socioeconomic levels while at the same time providing sufficient traffic flow and good vantage points for conducting observations.

A data collection day consists of a minimum of six hours of data collection. For the driver study, 1.5 hours are spent at each of 4 sites per day. The passenger study requires 6 hours per day at a single shopping center during hours of operation. The driver study is usually conducted on Monday through Thursday. The passenger study is usually conducted on Friday through Sunday.

Data Forms and Procedures

Data collection forms and procedures were also based on those used in the previous study. Minor modifications were made in the data collection forms to incorporate new data elements desired by NHTSA, to remove undesired data elements, and to facilitate data collection activities. The current data forms and instructions for their completion are provided in Appendix D.

Driver study procedures require data observers to collect data for a minimum of six hours per day; 1.5 hours at each of four sites. Collection site assignments are made by supervisory staff and consist of a specific date and time of day for each location. Time of day assignments correspond to one of the following time periods:

7:00 a.m. - 10:00 a.m.
10:00 a.m. - 1:00 p.m.
1:00 p.m. - 4:00 p.m.
4:00 p.m. - 7:00 p.m.

To the extent practical, collectors are deployed to a given site on the same day and during the same time period each time the city is visited.

To the extent possible, only privately-owned passenger cars and station wagons with in-state license plates are eligible for the driver study. Trucks, taxi cabs, and marked company-owned cars (i.e., those used for commercial purposes) are not eligible.

The target observation at signalized intersections is the second car that stops at the traffic light in the near lane (curb lane). If time permits, additional observations are made (i.e., the third and fourth stopped cars). However, if only one car stops for a traffic light, that vehicle is observed. Any vehicle that stops for a stop sign can be observed. Observers do not go on the roadway and are only responsible for observing the cars in the curb lane.

Passenger study procedures require data observers to conduct six hours of data collection for each day of the passenger study. Data are collected on Saturdays, Sundays, and at times on Fridays during hours when the shopping center is open for business. These days maximize the chances of obtaining observations on infants and toddlers. For each quarter, six passenger study days are conducted in each city.

Only non-commercial passenger cars and station wagons are eligible for the passenger study. The primary target observations are vehicles with children in the car. When primary target vehicles are not available for observation, safety belt usage for all adult passengers in a particular vehicle is recorded.

Data collectors are positioned at curbside, at a stop sign or signal controlled exit from the shopping center with the greatest flow of traf-

fic. Observers do not go on the roadway and are only responsible for observing the cars in the curb lane.

Procedures for the study of child safety seat installation requires observers to observe parked vehicles which contain one or more safety seats (i.e., infant, toddler or booster safety seats) in shopping center parking lots. The study is conducted at the passenger study shopping centers. This study is conducted for approximately two hours per week at each shopping center on the normally scheduled days of the passenger restraint study. Upon completion of this study, the passenger study is conducted for the remainder of the day. This study does not change the daily, weekly or monthly data collection schedule.

The helmet study is conducted as a "second priority" activity to all other study elements. Target vehicles are any motorcycle, moped or motorized bike observed on the highway or freeway during driver and passenger study data collection periods. Observations regarding helmet use are recorded for both drivers and passengers.

Development of Training Procedures

Training procedures were developed during the initial phases of the study and approved by NHTSA prior to conducting training activities. All procedures were developed around those used in the previous study to maximize consistency between the study efforts. Training included the study of an observer's manual, class room instructions, and in-field training. The total training program consisted of a 3 to 5 day training session, culminating in the certification of the observer for data collection activities.

Observer and Supervisor Training

Field personnel consist of five field data observers and one supervisor. Prior to deployment, observers and the supervisor received the 3 to 5 days of training either in Detroit or at field locations. Additional training of up to a week is conducted by the supervisor in the region assigned to a particular observer. All observer training was conducted by the supervisor and/or senior staff members. Follow-up supervisor field visits are made at least twice per year and more frequently when the need arises.

Data Collection

One data collection cycle (i.e., data collected at all sites in all 19 cities) is completed every three months. Field observers are permanently assigned to a city within one of five geographic regions of the country. Each observer has 3 to 4 cities within each region.

The supervisor is stationed in Detroit and is responsible for scheduling observer activities, supervising data entry and conducting data

quality control activities at field locations. Supervisory visits to each region are made on a routine basis or when the data collector or supervisor feels such a visit is warranted. During 1983, 30 days of supervisor visits were conducted. During these visits, field activities and observation techniques are monitored, procedural questions are answered, and observer accuracy and productivity is reviewed. Accuracy checks consists of the supervisor and observer collecting data independently on the same vehicles for both the driver and passenger study. Discrepancies are identified and discussed during the accuracy review.

Data Analysis

At the end of each week, data forms are submitted by field observers for review and entered to computer files. Data summaries are generated on a monthly basis and submitted to NHTSA. NHTSA-initiated requests for information are also responded to.

ANNUAL FINDINGS

The annual findings presented in this chapter are based on an analysis of data collected during the period November, 1982 through December, 1983.

Data Analysis Techniques

Data analysis consisted of the following activities:

- Generating descriptive data summary tables of occupant restraint usage versus a number of independent variables obtained during data collection activities (i.e., driver age, driver sex, type of safety seat, vehicle information, etc.).
- Comparing current occupant restraint usage with that reported in an earlier NHTSA study report (1).

Driver Study Findings

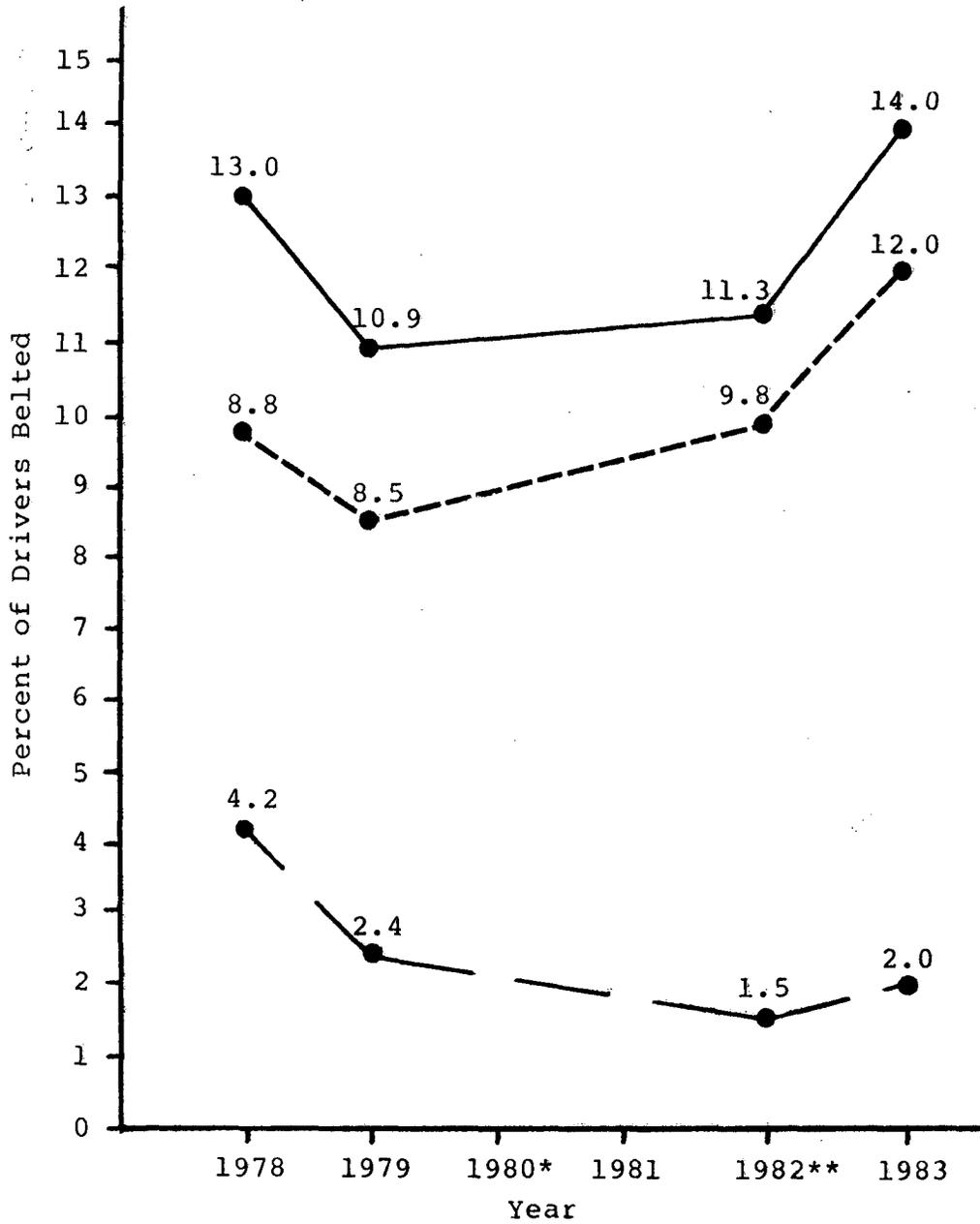
Three driver safety belt use conditions were possible:

- Both lap and shoulder belts properly used. This observation is possible for newer model cars for which the lap and shoulder belt are combined into one system or for older cars in which the lap and shoulder belts are separate.
- Lap belt only used. This observation is possible for older cars in which the driver is observed to use only the lap belt or in new model cars in which the driver is observed not to have the shoulder belt across his/her shoulder.
- No safety belt used.

The following data summaries illustrate the total number of drivers observed (referred to as "Base") and the percentage of the total base observed using either lap and shoulder belt or lap belt only (referred to as "Percent Restrained"). The percent restrained figures represent usage rates for the combined 19 city base, with each observation receiving equal weight. This procedure was employed in previous NHTSA studies and thus allows for consistency in the comparison of results.

Safety Belt Usage Trends

Annual driver safety belt usage rates from previous NHTSA studies were combined with the 1983 usage rates to produce Figure 2. It can be seen that overall usage rates in the 19 cities indicate no particular trend during the six year period. However, the highest rate was observed in 1983. Figure 2 also indicates that the percentage of drivers observed wearing lap belts only is decreasing while the percentage of drivers wearing the combination lap and shoulder belts is increasing. The divergence in these rates is due to older cars in the traffic population being replaced by newer vehicles equipped with the combination lap and shoulder belts.



— Total restrained
 - - - Lap and shoulder belt
 — Lap belt only

* Data was not collected in 1980.

** Represents data collected in 1981 and 1982.

Figure 2. Driver safety belt usage trends (1978-1983).

Safety Belt Use by City and Region

In 1983, driver safety belt usage for the 19 cities was 14.0 percent and ranged from a high of 25.6 percent in Seattle to a low of 5.6 percent in Fargo/Moorhead (Table 1). The rank ordering of city usage rates shown in Table 1 was similar to the previous study, which contained 1981-82 driver usage rates.

Table 1. Driver safety belt usage by city.

<u>City</u>	<u>Base</u>	<u>Percent Restrained</u>
Seattle	8,398	25.6
San Francisco	8,783	23.1
San Diego	11,048	22.4
Phoenix	6,885	20.0
Minneapolis/St. Paul	6,283	17.9
Los Angeles	10,102	15.0
Baltimore	5,245	13.9
Boston	6,827	13.6
Houston	6,569	13.1
Pittsburgh	7,295	12.4
Atlanta	8,687	12.4
Dallas	8,210	10.5
Providence	5,775	9.7
Miami	10,265	9.5
Birmingham	6,714	9.4
New York	7,277	8.7
New Orleans	9,045	8.6
Chicago	9,099	7.8
Fargo/Moorhead	3,798	5.6
Totals	146,305	14.0

Driver safety belt usage rates for the five data collection regions are shown in Table 2. The West and New England regions exhibited the highest rates as was observed in the previous study. The Southwest region, however, had the lowest rate in the previous study and now ranks as the third highest rate (among six regions) based on 1983 observations.

Table 2. Driver safety belt usage by region.

<u>Region</u>	<u>Base</u>	<u>Percent Restrained</u>
New England	12,602	11.8
Mid-Atlantic	19,817	11.4
Southeast	34,711	10.0
Southwest	14,779	11.7
Northcentral	19,180	10.7
West	45,216	21.1
Total	146,305	14.0

Driver Safety Belt Use by Quarter

Figure 3 shows the driver safety belt use percentages on a quarterly basis throughout 1983 which illustrate the relative stability of use rates during 1983.

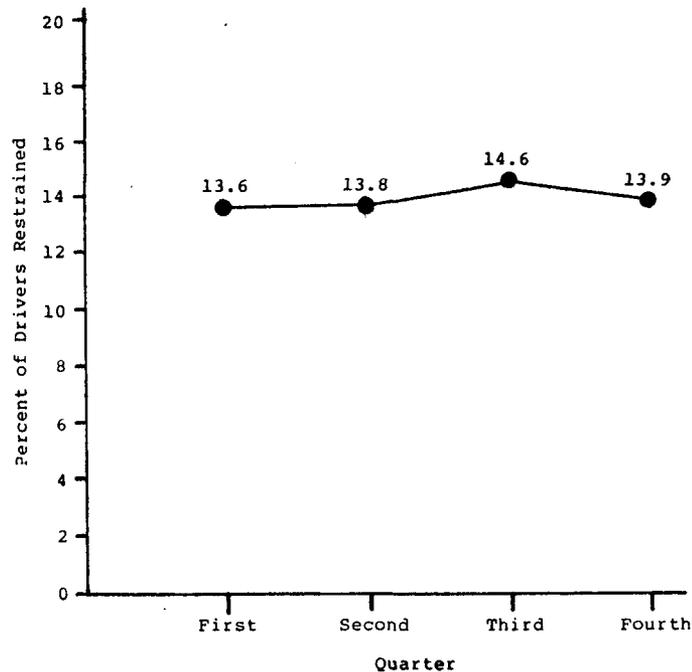


Figure 3. Driver safety belt trends by quarter (1983).

Safety Belt Use by Vehicle Model Year

License plate numbers recorded during the driver study for the period November, 1982 through April, 1983 were submitted to the various state departments of motor vehicles (DMV's) for the purpose of obtaining vehicle information. A total of 53,514 license plate numbers were submitted to 14 DMV's. The DMV's returned 50,742 vehicle records which were processed with the "Vindicator" program furnished by the Highway Loss Data Institute of Washington, D.C. (2). The Vindicator program produced valid vehicle information for 39,411 vehicles (including vehicle make, model, model year, and size) for the model years 1967-1984 (pre-1967 vehicles were observed but could not be processed by the Vindicator program).

Table 3 gives driver safety belt usage rates for vehicles observed between November, 1982 and April, 1983. Overall 14.4 percent of drivers in this data subset were observed using safety belts. It can be seen that drivers of newer model cars, beginning in 1980, are more likely to wear safety belts than their counterparts in early model years. Driver safety belt usage by manufacturer's division for model years 1976-1984 can be found in Appendix A.

Table 3. Driver safety belt usage by model year.

<u>Model Year</u>	<u>Base</u>	<u>Percent Restrained</u>
1967	165	14.5
1968	275	13.8
1969	375	11.4
1970	589	10.7
1971	751	12.1
1972	1,256	12.3
1973	1,787	10.8
1974	2,062	12.2
1975	1,901	11.4
1976	2,984	10.4
1977	3,679	12.5
1978	4,297	13.5
1979	4,819	13.9
1980	4,259	16.5
1981	4,076	18.1
1982	3,954	19.0
1983/1984	2,182	17.3
Total	39,411	14.4

Safety Belt Use By Restraint System Type

Observed safety belt usage, stratified by type of safety belt system is shown in Table 4. Passive (automatic) safety belt systems comprised less than 1 percent of all driver observations and resulted in a usage rate of 82.7 percent. Manual system usage varied from 11.6 percent for separate systems to 14.2 percent for combination systems. Due to model year limitations of the Vindicator program, rates for pre-1967 model years which have only lap belt restraints, could not be determined. Both the percentage of passive systems in the traffic population and the usage rates of manual safety belts are comparable with the previous study.

Table 4. Driver safety belt usage by safety belt system type.

<u>Safety Belt System Type</u>	<u>Base</u>	<u>Percent Restrained</u>
Automatic (Passive) System	295	82.7
Lap/Shoulder Combination (Model Years 1974-1984)	33,918	14.2
Lap/Shoulder Separate (Model Years 1968-1973)	5,033	11.6

A summary of the specific vehicle types for which passive safety belt systems are an option is shown in Table 5. It can be seen that Toyota experiences the highest rates of passive safety belt usage with 95.8 percent while Chevette has the lowest at 66.6 percent.

Table 5. Driver safety belt usage for vehicles with passive safety belt systems.

<u>Vehicles Make/System Type</u>	<u>Base</u>	<u>Percent Restrained</u>
Chevette - Automatic	33	66.6
Chevette - Manual	2,611	12.2
VW Rabbit/Jetta - Automatic	824	75.2
VW Rabbit/Jetta - Manual	1,969	26.7
Toyota - Automatic	239	95.8
Toyota - Manual	9,553	19.8

Safety Belt Use by Driver Sex

Observed safety belt use stratified by driver sex is shown in Table 6. As in the previous study, female drivers are more likely to wear safety belts. However, the percentage of safety belt usage and difference in usage rates between driver sex has increased. That is, in the previous study rates were 10.8 percent for males versus 12.2 percent for females; whereas, the current data indicates a wider disparity (i.e., 12.4 percent for males versus 16.4 percent for females).

Table 6. Driver safety belt usage by driver sex.

<u>Driver Sex</u>	<u>Base</u>	<u>Percent Restrained</u>
Male	86,170	12.4
Female	60,135	16.4
Total	146,305	14.0

Safety Belt Use by Driver Age

Table 7 shows that safety belt usage is highest among the 25 to 49 year age group (14.9 percent) and is the only "above average" group. A comparison with the previous study indicates increases in all age categories with the largest increase occurring in the 25 to 49 year age group (an increase of 3.3 percent) and the smallest increase in the over 49 group (an increase of 0.3 percent).

Table 7. Driver safety belt usage by age group.

<u>Age Group</u>	<u>Base</u>	<u>Percent Restrained</u>
Under 20	2,935	12.2
20-24	18,931	13.0
25-49	90,024	14.9
Over 50	34,370	12.6
Unknown	41	7.3
Total	146,305	14.0

Safety Belt Use by Car Size

Using data generated from the Vindicator program, driver safety belt usage was stratified by vehicle size as shown in Tables 8 and 9. When all model years are included, drivers of smaller size vehicles with less than 111-inch wheelbases are much more likely to wear safety belts than drivers in larger vehicles (Table 8).

Table 8. Driver safety belt usage by vehicle size for all model years.

<u>Vehicle Size</u>	<u>Base</u>	<u>Percent Restrained</u>
Subcompact (wheelbase less than 101 inches)	13,886	19.8
Compact (wheelbase 101-111 inches)	12,222	13.2
Intermediate (wheelbase less 112-120 inches)	9,315	9.9
Full Size (wheelbase more than 120 inches)	3,988	9.0
Total	39,411	14.4

When only newer model cars (1976-1984) are considered, similar but slightly higher usage rates were observed. This is shown in Table 9.

Table 9. Driver safety belt usage by vehicle size for 1976-1984 model years.

<u>Vehicle Size</u>	<u>Base</u>	<u>Percent Restrained</u>
Subcompact (wheelbase less than 101 inches)	11,518	20.4
Compact (wheelbase 101-111 inches)	10,085	13.5
Intermediate (wheelbase 112-120 inches)	6,987	10.4
Full size (wheelbase more than 120 inches)	1,600	9.2
Total	30,250	15.2

Safety Belt Use by Vehicle Make (Domestic versus Import)

Drivers of imported vehicles were observed to be twice as likely to wear safety belts than their domestic vehicle counterparts. Driver safety belt usage by vehicle make, generated from the Vindicator program, are shown in Tables 10 and 11. Table 10 shows that usage rates of 23.4 percent were observed for drivers of imported vehicles as opposed to 11.3 percent for domestic vehicles. The data summary is based on all model years observed.

Table 10. Driver safety belt usage by vehicle make for all model years.

<u>Vehicle Make</u>	<u>Base</u>	<u>Percent Restrained</u>
Domestic	29,430	11.3
Import	9,981	23.4
Total	39,411	14.4

Slightly higher usage rates for drivers of newer model cars (1976-1984) are shown in Table 11.

Table 11. Driver safety belt usage by vehicle make for 1976-1984 model years.

<u>Vehicle Make</u>	<u>Base</u>	<u>Percent Restrained</u>
Domestic	22,118	11.8
Import	8,132	24.4
Total	30,250	15.2

Safety Belt Use by Vehicle Manufacturer

Summaries of driver safety belt use by vehicle manufacturer for all model years (based on data from the Vindicator program) and newer model years (1976-1984) are shown in Tables 12 and 13, respectively. Drivers of Volkswagen were observed wearing safety belts in 31.1 and 41.5 percent of the observations; the highest of any manufacturer. Drivers of Chrysler products experienced the highest usage rates of the domestic vehicle manufacturers. These manufacturers showed the highest rates for import and domestic vehicles in the previous study.

When the older model vehicles were removed from the data summaries, Volkswagen and American Motors showed the greatest increase in driver usage rates. Safety belt usage for all other manufacturers remained relatively constant.

Table 12. Driver safety belt usage by vehicle manufacturer for all model years.

<u>Vehicle Manufacturer</u>	<u>Base</u>	<u>Percent Restrained</u>
AMC	553	11.6
Chrysler	3,725	13.5
Ford	6,528	11.5
GM	19,093	10.9
VW	1,700	31.1
Toyota	2,726	20.7
Datsun/Nissan	1,911	18.3
Other Imports	3,175	25.5
Total	39,411	14.4

Table 13. Driver safety belt usage by vehicle manufacturer for 1976 - 1984 model years.

<u>Vehicle Manufacturer</u>	<u>Base</u>	<u>Percent Restrained</u>
AMC	369	13.0
Chrysler	2,236	13.6
Ford	4,725	11.7
GM	14,788	11.6
VW	907	41.5
Toyota	2,418	21.1
Datsun/Nissan	1,603	17.9
Other Imports	3,204	25.2
Total	30,250	15.2

Since the three largest domestic manufacturers (GM, Ford and Chrysler) have a number of divisions under them (i.e., Dodge, Chrysler and Plymouth are divisions of Chrysler Corporation), driver safety belt usage was recorded for each division. Tables 14 and 15 illustrate driver safety belt usage rates for all model years (based on the Vindicator program outputs) and for newer model years (1976 - 1984), respectively. Table 14 shows that the Dodge division of Chrysler Corporation has the highest usage rate while the Lincoln division of Ford Motor Company has the lowest among the three largest domestic manufacturers. Table 15 shows similar usage rates for the subset of newer model years from 1976 to 1984. Divisions showing significantly higher usage rates for the newer models as compared to all models include Plymouth and Mercury. Driver safety belt usage by manufacturer's division and model year (1976-1984) are provided in Appendix A and safety belt usage by car series can be found in Appendix B. A special study was also conducted to determine the effectiveness of buzzers versus chimes for specific manufacturers and models. This analysis suggests that drivers of vehicles equipped with chimes are more likely to wear safety belts than their counterparts in vehicles with buzzers. The results of this study are reported in Appendix C.

Table 14. Driver safety belt usage by manufacturer's division for all model years.

<u>Manufacturer's Division</u>	<u>Base</u>	<u>Percent Restrained</u>
● Chrysler		
Chrysler	661	9.7
Dodge	1,325	13.9
Plymouth	1,372	13.2
● Ford		
Ford	5,356	11.6
Lincoln	292	6.5
Mercury	824	11.7
● GM		
Buick	3,396	11.8
Cadillac	1,731	9.5
Chevrolet	7,842	10.7
Oldsmobile	3,732	12.3
Pontiac	2,249	9.7

Table 15. Driver safety belt usage by manufacturer's division for 1976 - 1984 model years.

<u>Manufacturer's Division</u>	<u>Base</u>	<u>Percent Restrained</u>
● Chrysler		
Chrysler	518	10.1
Dodge	857	14.3
Plymouth	849	14.8
● Ford		
Ford	3,814	11.7
Lincoln	240	6.7
Mercury	663	13.0
● GM		
Buick	2,688	12.8
Cadillac	1,351	10.1
Chevrolet	5,841	11.1
Oldsmobile	3,086	12.5
Pontiac	1,754	10.3

Note: Manufacturer's division for which fewer than 50 vehicles were observed, are not reported in this table.

Safety Belt Use By Time of Day, Day of Week, and Season

Three time related variables were examined with respect to driver safety belt use. Table 16 shows usage rates stratified by the four daily data collection periods described earlier. It can be seen that drivers are more likely to use safety belts during the morning commute than during other times of the day. The previous study did not provide a basis for comparison.

Table 16. Driver safety belt usage by time period.

<u>Time Period</u>	<u>Base</u>	<u>Percent Restrained</u>
7 - 10 a.m.	30,013	15.4
10 a.m. - 1 p.m.	42,976	13.4
1 - 4 p.m.	50,372	13.8
4 - 7 p.m.	22,944	13.9
Total	146,305	14.0

Day of week usage characteristics are shown in Table 17. Safety belt usage on weekdays was found to be higher than on weekends.

Table 17. Driver safety belt usage by day.

<u>Time Period</u>	<u>Base</u>	<u>Percent Restrained</u>
Weekend	16,439	12.6
Weekday	129,866	14.2
Total	146,305	14.0

This finding was supported by the earlier study which reported rates of 11.7 and 10.5 percent for weekdays and weekends, respectively.

Seasonal variations in safety belt usage are shown in Table 18. Summer months exhibited the highest usage rate (15.5 percent) while spring had the lowest rates. This finding was not consistent with the previous study which indicated very small differences in usage rates between seasons, a range of 11.0 percent to 11.7 percent.

Table 18. Driver safety belt usage by season.

<u>Time Period</u>	<u>Base</u>	<u>Percent Restrained</u>
Winter	31,522	14.1
Spring	33,291	12.5
Summer	32,188	15.5
Fall	49,304	14.0
Total	146,305	14.0

Safety Belt Use By Site Characteristics

Tables 19, 20 and 21 show safety belt usage rates stratified by site type, area type, and road condition, respectively. Table 19 indicates that driver safety belt usage is higher on freeways than on non-freeway facilities. This characteristic was found in the previous study although the differences between usage rates on primary roads versus freeways are greater in the current study (i.e., a difference of 2.0 percent versus 0.7 percent in the previous study).

Table 19. Driver safety belt usage by site type.

<u>Site Type</u>	<u>Base</u>	<u>Percent Restrained</u>
Primary Road	107,157	13.5
Freeway Exit	39,148	15.5
Total	146,305	14.0

Safety belt use in city areas versus suburbs is shown in Table 20. City areas are characterized as central business district areas while suburb areas include heavy commercial, industrial or residential areas outside of the central city area. The current rates are higher than the previous study. The difference in rates between the strata are, however, similar.

Table 20. Driver safety belt usage by area type.

<u>Area Type</u>	<u>Base</u>	<u>Percent Restrained</u>
City	90,730	14.2
Suburb	55,575	13.8
Total	146,305	14.0

Safety belt usage, stratified by pavement condition is shown in Table 21. The data indicates a higher usage rate for wet pavement conditions as compared to dry or snowy/icy conditions. This finding is not supported by the earlier study which showed dry pavement conditions to have the highest usage rate.

Table 21. Driver safety belt usage by road condition.

<u>Road Condition</u>	<u>Base</u>	<u>Percent Restrained</u>
Dry	129,807	13.4
Wet	14,424	19.4
Ice/Snow	2,074	13.6
Total	146,305	14.0

Vehicle Occupancy

Safety belt use observations were only recorded for drivers in the driver study. However, information was recorded on the number of passengers in each vehicle for which a driver observation was made. Nearly 66 percent of the 146,305 vehicles observed were occupied by only the driver. Table 22 shows the passenger occupancy rates for all observed vehicles.

Table 22. Occupancy for vehicles observed in the driver study.

<u>Passenger Occupancy Per Vehicle</u>	<u>Observed</u>	<u>Percent of Total</u>
0	96,436	65.9
1	38,195	26.1
2	7,562	5.2
3	2,745	1.9
4 or more	1,367	0.9
Total	146,305	100.0

Table 23 shows the age distribution of passengers as observed in the driver study. Of the 146,305 vehicles observed, less than one percent had an infant passenger. The percentage of cars with passengers in the four other age categories were: toddlers 3.3 percent; subteens 3.7 percent; teens 3.0 percent; and adults 27.7 percent. These percentages are not representative of the distributions of passengers in the passenger study since in the passenger study observers are instructed to concentrate primarily on vehicles with toddlers and infants. In the driver study, the observers sample from the second car stopped for a traffic light.

Table 23. Percent of cars with passengers by age group in the driver study.

<u>Age Group</u>	<u>Percent of Vehicles</u>
Infants (less than 1 year)	0.5
Toddlers (1-4 years)	3.3
Subteens (5-12 years)	3.7
Teens (13-19 years)	3.0
Adults (20 and older)	27.7

Analysis of Key Variables

In the previous study (1), a number of key variables were identified as "predictors" of driver safety belt usage. The identified variables were:

- Model year of car (1976 and newer).
- Make of car (i.e., domestic or foreign).
- Size of car.
- Driver sex.
- Driver age.
- Data collection region.

To allow a basis for comparison between the previous and current study, the above listed variables are presented in a series of pair-wise summaries, in a fashion similar to the previous study. For each of Tables 24-38 a summary of the major findings are provided in the following sections.

The data summaries are based on a "verified" subset of driver safety belt usage data. Verified data include those observations for which vehicle information was received from state DMV's. Data received from the various DMV's were analyzed using the "Vindicator" program furnished by the Highway Loss Data Institute (2). Vindicator program output allowed an analysis of driver study information with vehicle information such as model year of vehicle, make of the vehicle, and vehicle size (based on wheelbase length).

The verified data base consisted of 30,250 observations recorded over a six-month period from November, 1982 through April, 1983. The 30,250 observations represent 56.5 percent of the 53,514 observations made during the six-month period and submitted to various state DMVs. The difference between the number of total observations and the number of observations in the verified data base is due to a variety of reasons including data collector errors in recording vehicle license plate numbers, inaccuracies/inconsistencies in state DMV data base, inconsistencies between observed vehicle characteristics and vehicle characteristics contained in the DMV data bases, and limitations of the Vindicator data base. The driver safety belt usage rate for this data base was 14.4 percent compared to 14.0 percent for the 146,305 observations that represent the entire 1983 driver study data base.

Driver Safety Belt Usage by Model Year and Driver Sex (Table 24)

- Driver safety belt usage increased consistently among each sex as model year increased.
- Safety Belt usage for female drivers of 1976-1984 model year cars is consistently higher than male driver safety belt usage for the equivalent model years.
- The findings of this comparison are similar to the findings from the previous study.

Driver Safety Belt Usage by Model Year and Driver Age (Table 25)

- Driver safety belt usage increases were relatively consistent among each age group as vehicle model year increased.
- The age group of 25 to 49 typically experienced the highest driver safety belt usage for each model year.
- The findings of this comparison are similar to the findings of the previous study.

Driver Safety Belt Usage by Model Year and Make (Table 26)

- Driver safety belt usage increased consistently as model year increased for each make of vehicle (domestic or imported).
- Driver safety belt usage for imports was higher than safety belt usage for domestic cars during the same model year.
- The findings of this comparison are similar to the findings from the previous study.

Table 24. Driver safety belt usage by model year (1976-1984) and driver sex.

<u>Driver Sex</u>	<u>Model Year</u>								<u>Total</u>
	<u>1976</u>	<u>1977</u>	<u>1978</u>	<u>1979</u>	<u>1980</u>	<u>1981</u>	<u>1982</u>	<u>1983-84</u>	
Male	8.1% (1,683)	10.0% (2,106)	12.6% (2,427)	12.1% (2,709)	14.6% (2,374)	15.8% (2,425)	18.5% (2,452)	16.4% (1,440)	13.6% (17,616)
Female	13.5% (1,301)	15.8% (1,573)	14.8% (1,870)	16.4% (2,110)	18.8% (1,885)	21.3% (1,651)	19.6% (1,502)	19.3% (742)	17.3% (12,634)
Total	10.4% (2,984)	12.5% (3,679)	13.5% (4,297)	13.8% (4,819)	16.5% (4,259)	18.0% (4,076)	18.9% (3,954)	17.4% (2,182)	(30,250)

27 Note: The percentages indicate the safety belt usage rates of the base number of observations shown parenthetically.

Table 25. Driver safety belt usage by model year (1976-1984) and driver age.

<u>Driver Age</u>	<u>Model Year</u>								<u>Total</u>
	<u>1976</u>	<u>1977</u>	<u>1978</u>	<u>1979</u>	<u>1980</u>	<u>1981</u>	<u>1982</u>	<u>1983-84</u>	
19 or under	11.4% (70)	10.1% (69)	10.8% (74)	15.3% (72)	16.7% (54)	15.0% (60)	6.0% (50)	14.3% (21)	12.3% (470)
20-24	11.4% (421)	11.5% (521)	12.8% (555)	13.7% (608)	15.5% (549)	19.1% (535)	17.5% (513)	14.4% (229)	14.6% (3,931)
25-49	10.4% (1,741)	13.2% (2,083)	13.6% (2,529)	15.4% (2,856)	17.3% (2,598)	19.6% (2,511)	20.4% (2,504)	19.6% (1,312)	16.3% (18,134)
50 or over	9.8% (752)	11.6% (1,006)	14.1% (1,139)	10.8% (1,282)	15.0% (1,056)	13.7% (964)	16.4% (886)	13.9% (620)	13.1% (7,705)
Total	10.4% (2,984)	12.5% (3,679)	13.5% (4,297)	14.0% (4,818)	16.5% (4,257)	18.1% (4,070)	18.9% (3,953)	17.4% (2,182)	14.6% (30,240)*

* Age information were available for 30,240 of the 30,250 total observations.

Note: The percentages indicate the safety belt usage rates of the base number of observations shown parenthetically.

Table 26. Driver safety belt usage by model year (1976-1984) and make.

<u>Make</u>	<u>Model Year</u>								<u>Total</u>
	<u>1976</u>	<u>1977</u>	<u>1978</u>	<u>1979</u>	<u>1980</u>	<u>1981</u>	<u>1982</u>	<u>1983-84</u>	
Domestic	8.7% (2,381)	10.6% (2,964)	10.5% (3,349)	10.9% (3,710)	12.7% (2,953)	13.7% (2,704)	14.7% (2,458)	14.2% (1,599)	11.8% (22,118)
Import	17.4% (603)	20.3% (715)	24.5% (948)	24.2% (1,109)	25.0% (1,306)	26.7% (1,374)	25.9% (1,496)	26.4% (583)	24.4% (8,132)
Total	10.4% (2,984)	12.5% (3,679)	13.5% (4,297)	14.0% (4,819)	16.5% (4,259)	18.0% (4,076)	18.9% (3,954)	17.4% (2,182)	(30,250)

29 Note: The percentages indicate the safety belt usage rates of the base number of observations shown parenthetically.

Driver Safety Belt Usage by Model Year and Region (Table 27)

- Driver safety belt usage increased consistently for all regions as model year increased.
- Driver safety belt usage in the West region was higher for each model year than any other region.
- The Northcentral region rates were consistently the lowest rates for model years 1976-1978 while the Southeast region was the lowest for the period 1979-1982.
- The findings of this comparison are similar to the findings from the previous study with the exception that in the previous study, the Southeast and Southwest regions consistently had the lowest driver safety belt usage rates for each model year.

Driver Safety Belt Usage by Model Year and Vehicle Size (Table 28)

- Driver safety belt usage increased consistently for all vehicle sizes as model year increased.
- Driver safety belt usage increased consistently as vehicle size decreased for each model year.
- The findings of this comparison are similar to the findings of the previous study.

Driver Safety Belt Usage by Vehicle Make and Driver Sex (Table 29)

- Driver safety belt usage among imports was higher than safety belt usage among domestic cars for each sex.
- Safety belt usage among female drivers was higher than male driver safety belt usage for both domestic and imported cars.
- The findings of this comparison are relatively similar to the findings from the previous study.

Driver Safety Belt Usage by Vehicle Make and Driver Age (Table 30)

- Driver safety belt usage among imports was higher than restraint usage among domestic cars for each age group.
- The age group of 25 to 49 experienced the highest driver safety belt usage for each make.
- The findings of this comparison are relatively similar to the findings from the previous study.

Table 27. Driver safety belt usage by model year (1976-1984) and region.

Region	Model Year								Total
	1976	1977	1978	1979	1980	1981	1982	1983-84	
New England	9.6% (436)	10.5% (459)	11.9% (520)	13.8% (529)	13.6% (516)	16.0% (544)	14.9% (530)	14.0% (349)	13.1% (3,883)
Mid-Atlantic	8.5% (574)	13.0% (732)	11.6% (807)	14.2% (956)	13.0% (888)	14.2% (955)	16.5% (877)	17.5% (599)	13.7% (6,388)
Southeast	8.4% (538)	10.0% (663)	8.8% (809)	7.0% (889)	10.5% (866)	12.0% (566)	13.0% (531)	15.7% (535)	10.3% (5,397)
Southwest	7.7% (323)	8.9% (436)	11.4% (543)	10.4% (614)	17.6% (522)	18.2% (638)	20.5% (697)	21.8% (156)	14.6% (3,929)
Northcentral	6.3% (317)	7.3% (400)	8.2% (416)	12.7% (455)	12.1% (373)	16.8% (393)	13.2% (365)	13.9% (332)	11.3% (3,051)
West	16.3% (796)	18.4% (989)	21.5% (1,202)	20.3% (1,376)	26.4% (1,094)	26.7% (980)	27.8% (954)	28.9% (211)	22.7% (7,602)
Total	10.4% (2,984)	12.5% (3,679)	13.5% (4,297)	14.0% (4,819)	16.5% (4,259)	18.0% (4,076)	18.9% (3,954)	17.4% (2,182)	15.3% (30,250)

Note: The percentages indicate the safety belt usage rates of the base number of observations shown parenthetically.

Table 28. Driver safety belt usage by model year (1976-1984) and vehicle size.

<u>Vehicle Size</u>	<u>Model Year</u>								<u>Total</u>
	<u>1976</u>	<u>1977</u>	<u>1978</u>	<u>1979</u>	<u>1980</u>	<u>1981</u>	<u>1982</u>	<u>1983-84</u>	
Subcompact	13.6% (853)	17.9% (878)	20.9% (1,267)	20.7% (1,649)	21.3% (1,897)	22.4% (1,928)	20.6% (2,116)	21.4% (930)	20.4% (11,518)
Compact	10.8% (683)	13.3% (694)	10.9% (1,618)	10.5% (1,719)	13.0% (1,701)	14.7% (1,608)	19.2% (1,286)	17.3% (776)	13.5% (10,085)
Intermediate	9.0% (918)	10.0% (1,756)	10.7% (1,121)	10.2% (1,265)	12.5% (577)	12.6% (466)	11.4% (484)	9.0% (400)	10.4% (6,987)
Full Size	8.1% (530)	9.7% (351)	6.9% (291)	11.8% (186)	5.6% (84)	9.5% (74)	17.7% (68)	13.2% (76)	9.2% (1,660)
Total	10.4% (2,984)	12.5% (3,679)	13.5% (4,297)	14.0% (4,819)	16.5% (4,259)	18.0% (4,076)	18.9% (3,954)	17.4% (2,182)	(30,250)

Note: The percentages indicate the safety belt usage rates of the base number of observations shown parenthetically.

Table 29. Driver safety belt usage by vehicle make and driver sex.
(1976-1984 model years)

<u>Driver Sex</u>	<u>Vehicle Make</u>		<u>Total</u>
	<u>Domestic</u>	<u>Import</u>	
Male	10.6% (13,100)	22.5% (4,516)	13.6% (17,616)
Female	13.6% (9,018)	26.8% (3,616)	17.3% (12,634)
Total	11.8% (22,118)	24.4% (8,132)	(30,250)

Table 30. Driver safety belt usage by vehicle make and driver age.
(1976-1984 model years)

<u>Driver Age</u>	<u>Vehicle Make</u>		<u>Total</u>
	<u>Domestic</u>	<u>Import</u>	
19 or under	7.7% (297)	20.2% (173)	12.3% (470)
20-24	10.0% (2,436)	21.9% (1,495)	14.6% (3,931)
25-49	12.3% (12,920)	26.0% (5,214)	16.3% (18,134)
50 or over	11.5% (6,457)	21.4% (1,248)	13.1% (7,705)
Total	11.8% (22,110)	24.4% (8,130)	(30,240)

Note: Percentages indicate the safety belt usage rates of the base number of observations shown parenthetically.

Driver Safety Belt Usage by Vehicle Make and Region (Table 31)

- Driver safety belt usage among imports was higher than safety belt usage among domestic cars for each data collection region.
- Driver safety belt usage in the West region was higher for each vehicle make than any other region.
- The findings of this comparison are similar to the findings from the previous study.

Driver Safety Belt Usage by Vehicle Make and Vehicle Size (Table 32)

- Driver safety belt usage among imports was higher than safety belt usage for drivers of domestic cars for each vehicle size.
- Driver safety belt usage generally increases as vehicle size decreases for each vehicle make.
- The findings of this comparison are similar to the findings from the previous study.

Driver Safety Belt Usage by Vehicle Size and Driver Sex (Table 33)

- Driver safety belt usage for each sex decreased as vehicle size increased.
- Safety belt usage among female drivers was consistently higher than male driver safety belt usage for each vehicle size.
- The findings of this comparison are relatively similar to the findings from the previous study.

Driver Safety Belt Usage by Vehicle Size and Driver Age (Table 34)

- Driver safety belt usage for each age group generally decreased as vehicle size increased.
- On a total basis, those drivers aged 25 to 49 years have a higher safety belt usage than any other age group.
- The findings of this comparison are relatively similar to the findings from the previous study.

Table 31. Driver safety belt usage by vehicle make and region.
(1976-1984 model years)

<u>Region</u>	<u>Vehicle Make</u>		
	<u>Domestic</u>	<u>Import</u>	<u>Total</u>
New England	8.3% (2,619)	23.3% (1,264)	13.1% (3,883)
Mid-Atlantic	11.5% (4,884)	20.7% (1,504)	13.7% (6,388)
Southeast	9.2% (4,330)	14.8% (1,067)	10.3% (5,397)
Southwest	11.5% (3,166)	27.8% (763)	14.6% (3,929)
Northcentral	9.6% (2,582)	20.7% (469)	11.3% (3,051)
West	18.0% (4,537)	29.7% (3,065)	22.7% (7,602)
Total	11.8% (22,118)	24.4% (8,132)	(30,250)

Table 32. Driver safety belt usage by vehicle make and vehicle size.

(1976-1984 model years)

<u>Vehicle Size</u>	<u>Vehicle Make</u>		
	<u>Domestic</u>	<u>Import</u>	<u>Total</u>
Subcompact	15.0% (4,310)	23.6% (7,208)	20.4% (11,518)
Compact	11.8% (9,190)	30.7% (895)	13.5% (10,085)
Intermediate	10.3% (6,962)	28.0% (25)	10.4% (6,987)
Full Size	9.2% (1,656)	25.0% (4)	9.2% (1,660)
Total	11.8% (22,118)	24.4% (8,132)	(30,250)

Note: The percentages indicate the safety belt usage rates of the base number of observations shown parenthetically.

Table 33. Driver safety belt usage by vehicle size and driver sex.

(1976-1984 model years)

Driver Sex	Vehicle Size				
	Subcompact	Compact	Intermediate	Full Size	Total
Male	19.1% (6,394)	12.2% (5,900)	8.9% (4,262)	7.9% (1,060)	13.6% (17,616)
Female	22.0% (5,124)	15.4% (4,185)	12.7% (2,725)	11.5% (600)	17.3% (12,634)
Total	20.4% (11,518)	13.5% (10,085)	10.4% (6,987)	9.2% (1,660)	30.2% (30,250)

Table 34. Driver safety belt usage by vehicle size and driver age.

(1976-1984 model years)

Driver Age	Vehicle Size				
	Subcompact	Compact	Intermediate	Full Size	Total
19 or under	14.6% (246)	9.9% (131)	7.5% (80)	23.1% (13)	12.3% (470)
20-24	19.0% (2,106)	9.8% (1,117)	7.9% (580)	12.5% (128)	14.6% (3,931)
25-49	21.8% (7,273)	14.6% (6,049)	10.3% (3,949)	8.6% (863)	16.3% (18,134)
50 or over	17.3% (1,889)	12.9% (2,783)	11.2% (2,377)	9.2% (656)	13.1% (7,705)
Total	20.4% (11,514)	13.5% (10,080)	10.4% (6,986)	9.2% (1,660)	30.2% (30,240)

Note: The percentages indicate the safety belt usage rates of the base number of observations shown parenthetically.

Driver Safety Belt Usage by Vehicle Size and Region (Table 35)

- Driver safety belt usage for each region generally decreased as vehicle size increased.
- Driver safety belt usage in the West region was usually much higher than any other region by vehicle size.
- The findings of this comparison are similar to the findings from the previous study.

Driver Safety Belt Usage by Driver Sex and Region (Table 36)

- Driver safety belt usage among females was higher than male driver safety belt usage in each region except the Southwest.
- Driver safety belt usage in the West region was higher than any other region among each sex.
- The findings of this comparison are relatively similar to the findings from the previous study.

Driver Safety Belt Usage by Driver Sex and Driver Age (Table 37)

- Driver safety belt usage among females was higher than male driver safety belt usage for each age group.
- Driver safety belt usage for those 25 to 49 years old was higher than any other age group for each sex.
- Younger female drivers (under 19 years of age) are more than twice as likely to wear safety belts than males of the same age group.
- The findings of this comparison are relatively similar to the findings from the previous study.

Driver Safety Belt Usage by Driver Age and Region (Table 38)

- Driver safety belt usage in the Mid-Atlantic, Northcentral and West were highest for those 24 to 49 years old.
- Driver safety belt usage in the West region was higher than any other region for each age group except those 19 or under.
- The findings of this comparison are relatively similar to the findings from the previous study.

Table 35. Driver safety belt usage by vehicle size and region.

(1976-1984 model years)

Vehicle Size

<u>Region</u>	<u>Subcompact</u>	<u>Compact</u>	<u>Intermediate</u>	<u>Full Size</u>	<u>Total</u>
New England	18.8% (1,759)	9.4% (1,208)	8.2% (770)	21.0% (146)	13.1% (3,883)
Mid-Atlantic	16.9% (2,447)	12.5% (2,178)	10.7% (1,426)	11.0% (337)	13.7% (6,388)
Southeast	13.9% (1,637)	9.0% (1,920)	8.9% (1,497)	6.7% (343)	10.3% (5,397)
Southwest	21.6% (1,088)	13.8% (1,398)	10.0% (1,134)	11.0% (309)	14.6% (3,929)
Northcentral	16.2% (876)	12.0% (1,058)	7.5% (886)	4.8% (231)	11.3% (3,051)
West	27.0% (3,711)	20.9% (2,323)	15.5% (1,274)	15.3% (294)	22.7% (7,602)
Total	20.4% (11,518)	13.5% (10,085)	10.4% (6,987)	9.2% (1,660)	(30,250)

Note: The percentages indicate the safety belt usage rates of the base number of observations shown parenthetically.

Table 36. Driver safety belt usage by driver sex and region.

(1976-1984 model years)

<u>Region</u>	<u>Male</u>	<u>Female</u>	<u>Total</u>
New England	11.0% (2,462)	16.8% (1,421)	13.1% (3,883)
Mid-Atlantic	11.0% (4,004)	18.2% (2,384)	13.7% (6,388)
Southeast	9.9% (3,059)	10.8% (2,338)	10.3% (5,397)
Southwest	15.3% (2,104)	13.9% (1,825)	14.6% (3,929)
Northcentral	10.5% (1,968)	12.9% (1,083)	11.3% (3,051)
West	21.4% (4,019)	24.3% (3,583)	22.7% (7,602)
Total	13.6% (17,616)	17.3% (12,634)	(30,250)

Table 37. Driver safety belt usage by driver sex and driver age.

(1976-1984 model years)

Driver Sex

<u>Driver Age</u>	<u>Male</u>	<u>Female</u>	<u>Total</u>
19 or under	8.1% (235)	16.6% (235)	12.3% (470)
20-24	11.9% (2,119)	17.7% (1,812)	14.6% (3,931)
25-49	15.0% (10,327)	17.9% (7,807)	16.3% (18,134)
50 or over	11.8% (4,933)	15.5% (2,772)	13.1% (7,705)
Total	13.6% (17,614)	17.3% (12,626)	(30,240)

Note: The percentages indicate the safety belt usage rates of the base number of observations shown parenthetically.

Table 38. Driver safety belt usage by driver age and region.

(1976-1984 model years)

Region	Driver Age				Total
	19 or under	20-24	24-49	50 or over	
New England	17.2% (93)	11.7% (947)	13.2% (1,754)	13.9% (1,089)	13.1% (3,883)
Mid-Atlantic	9.4% (107)	14.0% (924)	15.2% (3,433)	11.2% (1,924)	13.7% (6,388)
Southeast	10.8% (74)	13.3% (332)	10.8% (3,413)	8.7% (1,577)	10.3% (5,396)
Southwest	0.0% (10)	8.6% (385)	15.3% (2,883)	15.4% (642)	14.6% (3,920)
Northcentral	6.3% (32)	6.8% (191)	12.4% (1,911)	10.3% (917)	11.3% (3,051)
West	14.3% (154)	21.0% (1,152)	24.3% (4,740)	20.1% (1,556)	22.7% (7,602)
Total	12.3% (470)	14.6% (3,931)	16.3% (18,134)	13.1% (7,705)	(30,240)

Note: The percentages indicate the safety belt usage rates of the base number of observations shown parenthetically.

Passenger Study Findings

A total of 114,470 passengers were observed in 76,323 vehicles during the period November, 1982 through December, 1983. The data collection effort recognized three specific age groups within the "child" population: infants under one year old; toddlers from ages 1 to 4; and subteens from ages 5 to 12. Observers categorized children within one of these groups to the best of their ability. However, this observation is relatively difficult and prone to inaccuracies and, therefore, age group designation should be considered as approximate. Other age categories included teens (13-19 years old) and adults (20 years and older). Table 39 shows the distribution of passenger observations among the various age groups.

Table 39. Age distribution of passengers observed in the passenger study.

<u>Age Group</u>	<u>No. of Passengers</u>	<u>Percent of Total</u>
Infant (under 1 year)	1,869	1.6
Toddler (1-4 years)	13,978	12.2
Subteen (5-12 years)	14,040	12.3
Teen (13-19 years)	10,937	9.5
Adult (20 years & older)	73,646	64.3
Total	114,470	100.0

The use of child safety seats and safety belts for passengers is shown in Figure 4. For infants and toddlers combined, the proportion observed in an approved safety seat is 40.5 percent. The percentage of each age group observed wearing safety belts is 5.3 percent for toddlers, 8.6 percent for subteens, 7.0 percent for teens and 10.5 percent for adults. As a comparison, Figure 4 also shows the proportion of drivers using safety belts (14.0 percent).

Table 40 also summarizes the findings of the passenger study for the various age groups. Detailed summaries of the passenger study observations are provided in the next sections for each age group.

Infants (Under 1 Year)

Infant observations consisted of recording the seating position and type of restraint for children estimated to be younger than 1 year of age. Possible observations for infant restraint type include:

- Safety belt
- Approved safety seat
- Unsafe seat (flimsy seat)
- No restraint

If an infant was observed in an approved safety seat, use of the safety seat harness and safety belt attachment to the safety seat for non-convertible safety seats was recorded. If the infant was observed to

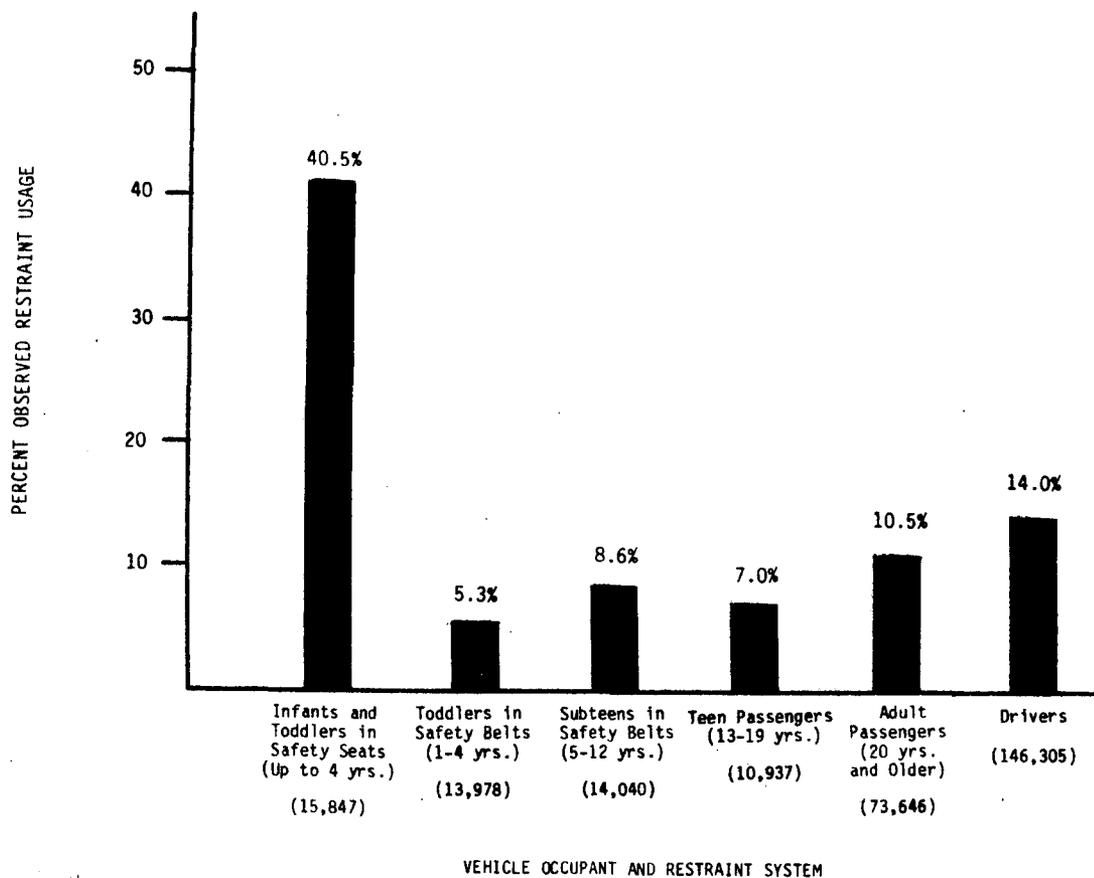


Figure 4. Observed use of restraint system by vehicle occupants.

Table 40. Passenger restraint system use by age group.

Age Group	Base	In Safety Seat	Appears Correct
Infant/Toddler	15,847	40.5	29.0*
Infant	1,869	60.4	41.0
Toddler	13,978	37.8	27.4*
Subteen	14,040	0.3	8.6**
Teen	10,937	N/A	7.0
Adult	73,646	N/A	10.5

* Appears correct for toddlers was assessed on the basis of proper use of safety seat harness only. No attempt was made to assess the correctness of seat installation or tethering for toddler seats.

** Includes correctly restrained by safety belt with and without a booster safety seat.

be properly harnessed, belted, and facing toward the rear of the vehicle, the restraint condition was classified as "Appears Correct". If improper harnessing, belting or positioning is observed, the condition was classified as "Obviously Incorrect". Because the majority of infant safety seats were of the non-convertible type (approximately 74 percent of observed infant observations), the assessment of correct/incorrect belt use could be made accurately since the belt crosses in front of the infants.

A total of 1,869 infants were observed in the 19 cities. Of this total, 60.4 percent were observed in approved safety seats. Of the 739 infants not observed in safety seats, unused safety seats were observed in 95 (12.9 percent) of the observations. Overall, 41.0 percent of all infants were observed to be correctly harnessed in an approved safety seat. Flimsy (unapproved) seats were observed in 4.1 percent of the observations. Table 41 shows a summary of these results by city.

Table 41. Infant safety seat usage by city.

<u>City</u>	<u>Base</u>	<u>Percent In Safety Seat</u>	<u>Percent Appears Correct</u>
San Diego	59	79.7	59.3
Boston	170	77.6	57.6
Seattle	64	76.6	67.2
Baltimore	152	75.0	58.6
New York	169	69.8	56.2
Providence	145	69.7	55.2
Chicago	112	69.6	31.3
Minneapolis/St. Paul	83	67.5	24.1
San Francisco	68	66.2	58.8
Fargo/Moorhead	88	55.7	14.8
New Orleans	80	55.0	36.3
Pittsburgh	76	56.6	34.2
Miami	119	53.8	31.1
Atlanta	82	51.2	34.1
Phoenix	61	45.9	23.0
Birmingham	80	43.8	40.0
Dallas	94	40.4	21.3
Houston	104	28.8	15.4
Los Angeles	63	27.0	20.6
Total	1,869	60.4	41.0

A comparison with the previous study results indicates an increase in the percentage of infants in safety seats. The previous study reported 40.4 percent in safety seats as compared to 60.4 in the current study.

For the 1,130 infants observed in safety seats, 67.9 percent were observed to be correctly harnessed (and belted for non-convertible seats). Of the 32.1 percent that were obviously incorrect, failure or improper attachment of the safety belt was the most predominant type of incorrect usage. Table 42 shows the types of observed improper uses of infant safety seats. The use of flimsy seats was reduced from 12.1 percent in the previous study to 4.1 percent.

Table 42. Characteristics of infants observed in safety seats.

<u>Safety Seat Usage</u>	<u>Number</u>	<u>Percent</u>
Appears Correct	767	67.9
No Harness	38	3.4
No Belt	110	9.7
No Harness or Belt	46	4.1
Other Unsafe Usage (primarily forward facing)	119	10.5
Unsure	50	4.4
Total	1,130	100.0

Table 43 shows that the 1,869 infants observed in the passenger study were evenly distributed among the front and back seat, with the front seat outboard position being the most likely position for an infant. Table 43 also shows that an infant in the back seat is nearly twice as likely to be in an approved safety seat and over 2 times as likely to be properly transported in the seat than infants observed in the front seat. This phenomenon was also found in the previous study.

Table 43. Safety seat usage for infants by seat position.

<u>Seat Position</u>	<u>Base</u>	<u>Percent Observed in Safety Seat</u>	<u>Percent Appears Correct</u>
Front Seat - Center	170	60.0	30.0
Front Seat - Outboard	766	39.3	23.7
Total Front Seat	936	43.1	24.9
Back Seat - Driver	283	74.2	54.4
Back Seat - Center	205	83.9	62.9
Back Seat - Outboard	443	77.7	56.7
Total Back Seat	931	78.0	57.3
Rear (for station wagons & hatchbacks)	2	50.0	0.0
Total	1,869	60.4	41.0

Toddlers (Ages 1 to 4 Years)

Toddler observations consisted of recording the same types of data as collected for infants. However, due to the difficulty of observing the belting of the toddler safety seat (and in some cases the tether), the correct usage of the toddler seats was based on an observation of the harness or shield. In addition, some children who were classified as toddlers, were observed in booster seats.

A total of 13,978 toddlers were observed during the passenger study. Of these, 37.8 percent were observed in either a toddler seat or booster seat. Table 44 summarizes the toddler observations.

Table 44. Methods of restraining toddlers.

<u>Type of Restraint</u>	<u>Number</u>	<u>Percent</u>
Approved Toddler Seat	4,977	35.6
Approved Booster Seat	311	2.2
Safety Belt	735	5.3
None or Unsafe Seats	7,955	56.9
Totals	13,978	100.0

Table 45 shows the type of restraint usage by toddlers and the percentage of correct usage of safety seats by city. Overall, 37.8 percent of observed toddlers were correctly harnessed or shielded in a child safety seat.

Table 46 shows the result of the other observation categories for toddlers observed in toddler safety seats. Factors such as insufficient time or too many children affect the ability to make a positive observation regarding harnessing or shielding. These observations are reported as "unsure". Similarly, Table 47 summarizes the observations of toddlers in approved booster seats. Of the 8,690 toddlers that were not in safety seats, unused safety seats were observed in 8.2 percent of the vehicles.

A comparison of the above findings with those of the previous study indicates a significant increase in the percentage of toddlers in safety seats. Safety seat usage increased from 19.4 to 37.8 percent. Also, an increase was observed in the use of safety belts by toddlers from 2.8 percent to 5.3 percent and the use of flimsy seats decreased from 2.2 percent (in the previous study) to less than 1 percent.

Table 45. Restraint usage by city for toddlers.

City	Base	Percent Observed Using Safety Belt	Percent Observed In Toddler Seats	Percent Harnessed/ Shielded In Toddler Seats	Percent Observed In Booster Seats	Percent Correctly Belted In Booster Seats	Percent Observed In Safety Seats
Baltimore	560	3.4	61.8	52.9	2.1	2.1	63.9
Providence	577	2.3	59.6	50.4	1.4	1.2	61.0
Boston	684	5.8	55.0	46.5	2.3	1.7	57.3
Miami	758	1.2	48.2	26.0	1.7	0.3	49.9
New York	702	4.4	47.4	39.9	2.3	1.7	49.7
Birmingham	595	1.5	42.7	26.7	3.0	0.3	45.7
San Diego	511	6.3	41.3	38.0	0.8	0.6	42.1
Minneapolis/St. Paul	861	10.9	35.4	22.0	6.2	1.1	41.6
Atlanta	666	2.4	38.3	24.5	2.8	0.0	41.1
Chicago	1,196	8.2	35.8	23.7	4.8	1.3	40.6
New Orleans	723	1.7	36.4	19.5	2.2	0.3	38.6
Pittsburgh	550	9.4	33.3	21.6	2.2	1.1	35.5
San Francisco	632	8.7	34.7	32.7	0.6	0.2	35.3
Seattle	684	8.3	28.9	26.9	2.1	1.5	31.0
Fargo/Moorhead	652	5.1	21.9	11.0	2.5	0.6	24.4
Phoenix	914	4.1	23.3	18.2	0.9	0.2	24.2
Dallas	884	4.2	22.0	18.9	1.4	0.1	23.4
Los Angeles	877	5.5	20.6	18.9	0.8	0.2	21.4
Houston	948	4.2	17.4	13.6	0.5	0.2	17.9
Total	13,978	5.3	35.6	26.6	2.2	0.8	37.8

Table 46. Characteristics of toddlers observed in toddler safety seats.

<u>Toddler Seat Usage</u>	<u>Number</u>	<u>Percent</u>
Correctly Harnessed/Shielded	3,732	75.0
No Harness or Shield	502	10.1
Unsure	743	14.9
Totals	4,977	100.0

Table 47. Characteristics of toddlers observed in booster seats.

<u>Booster Seat Usage</u>	<u>Number</u>	<u>Percent</u>
Correctly Belted	105	33.8
No Belt	149	47.9
No Harness or Tether	34	10.9
Unsure	23	7.4
Total	311	100.0

The relationship between seating position and safety belt/seat use is summarized in Table 48. As was the case for infants, toddlers in approved safety seats are more likely to be observed in the back seat than in the front; 49.6 percent in back compared to 18.1 percent in the front seat. Similarly, correct usage was high for toddlers positioned in the back seat. This phenomenon was also reported in the earlier study.

Subteens (Ages 5 to 12 Years)

A total of 14,041 subteens were observed in the 19 cities during the passenger study. Use of the booster seats were observed in approximately 0.3 percent of the cases. Safety belt use for this age group was found to be 8.6 percent. This compares to 4.7 percent in the previous study. Table 49 shows safety belt usage by city for the subteen age group.

Table 50 shows subteen safety belt usage by seating position. The current study indicates that the majority of subteens were observed in front seat positions. The previous study reported the same finding. Comparisons of safety belt usage did, however, indicate different findings. In the current effort, subteens were observed to be over twice as likely to wear safety belts in the front seat. In the previous study, there was less than a one percent difference between front and back seat safety belt usage for subteens.

Table 48. Safety seat/belt usage by seat position for toddlers.

<u>Seat Position</u>	<u>Base</u>	<u>Percent Observed Using Safety Belt</u>	<u>Percent Observed In Toddler Seats</u>	<u>Percent Harnessed/ Shielded In Toddler Seats</u>	<u>Percent Observed In Booster Seats</u>	<u>Percent Correctly Belted In Booster Seats</u>	<u>Percent Observed In Safety Seats</u>
Front Seat - Center	1,439	2.3	7.7	4.4	1.0	0.1	8.7
Front Seat - Outboard	3,534	9.3	19.6	13.8	2.3	0.6	21.9
Front Seat - Total	4,973	7.2	16.1	11.1	2.0	0.4	18.1
Back Seat - Driver	2,901	5.6	54.6	42.8	3.4	1.1	58.0
Back Seat - Center	2,668	1.9	31.7	22.4	1.5	0.5	33.2
Back Seat - Outboard	3,243	4.9	53.4	41.2	2.3	1.1	55.7
Back Seat - Total	8,812	4.3	47.3	36.0	2.4	0.9	49.6
Rear	213	0.9	4.2	2.8	0.9	0.0	5.2
Total	13,998	5.3	35.6	26.7	2.2	0.7	37.8

Table 49. Passenger safety belt usage by city for subteens.

<u>City</u>	<u>Base</u>	<u>Percent Restrained</u>
Minneapolis/St. Paul	777	15.8
Chicago	1,285	13.0
Pittsburgh	866	11.5
Phoenix	591	11.3
San Diego	581	10.7
Houston	724	9.7
Seattle	455	9.2
San Francisco	787	8.8
Los Angeles	691	8.7
Atlanta	834	7.9
Dallas	849	7.5
New York	767	6.6
Boston	632	6.3
Miami	767	6.0
New Orleans	874	5.9
Birmingham	559	5.7
Baltimore	577	5.0
Providence	598	4.8
Fargo/Moorhead	826	4.7
Total	14,040	8.6

Table 50. Passenger safety belt usage for subteens by seat position.

<u>Seat Position</u>	<u>Base</u>	<u>Percent Restrained</u>
Front Seat - Center	636	2.3
Front Seat - Outboard	4,310	15.5
Total Front Seat	4,946	13.8
Back Seat - Driver	3,307	6.4
Back Seat - Center	2,263	2.3
Back Seat - Outboard	3,154	8.1
Total Back Seat	8,724	6.0
Rear (i.e., station wagons & hatchbacks)	371	0.0
Total	14,041	8.6

Teens (Ages 13 to 19 Years)

This age group was observed to have the lowest safety belt usage of the age groups for which safety belts are designed. Of a total of 10,936 teens, only 7.0 percent were observed using safety belts. This compares with 3.1 percent for 14,426 teens observed in the previous study. Table 51 shows teen safety belt usage by city for each of the 19 cities. The percentage of use range from a high of 11.9 percent for Baltimore to a low of 0.3 percent for Fargo/Moorhead.

Table 51. Passenger safety belt usage for teens by city.

<u>City</u>	<u>Base</u>	<u>Percent Restrained</u>
Baltimore	612	11.9
Phoenix	396	9.3
Houston	585	8.4
Los Angeles	970	8.0
San Diego	677	7.7
Atlanta	671	7.6
Minneapolis/St. Paul	321	7.5
New York	584	7.4
Chicago	457	7.0
San Francisco	1,103	6.7
Boston	652	6.4
Seattle	621	6.4
New Orleans	520	6.3
Providence	545	6.2
Dallas	505	5.7
Pittsburgh	599	5.5
Miami	493	4.5
Birmingham	321	4.4
Fargo/Moorhead	305	0.3
Total	10,937	7.0

Safety belt use by seating position (Table 52) indicates that teens in front seat positions were nearly four times more likely to be observed wearing safety belts than those in back seat positions. Also, the majority of teens were observed in the front seat. Similar distribution of seating positions and the differential in the front versus back seat usage rates were observed in the previous study.

Table 52. Passenger safety belt usage for teens by seat position.

<u>Seat Position</u>	<u>Base</u>	<u>Percent Restrained</u>
Front Seat - Center	345	0.9
Front Seat - Outboard	6,472	10.1
Total Front Seat	6,817	9.7
Back Seat - Driver	1,470	2.8
Back Seat - Center	602	1.0
Back Seat - Outboard	1,945	2.8
Total Back Seat	4,017	2.5
Rear (i.e., station wagon & hatchbacks)	102	0.0
Total	10,936	7.0

Adults (20 Years and Older)

Adult passengers were observed wearing safety belts in 10.5 percent of 73,646 observations. This compares with 7.4 percent usage rates for the previous study. Table 53 shows the number of observations and percent safety belt usage for each of the 19 cities. The highest safety belt usage was observed in Minneapolis/St. Paul (15.4 percent) and the lowest was observed in Fargo/Moorhead (5.0 percent).

Table 53. Passenger safety belt usage for adults by city.

<u>City</u>	<u>Base</u>	<u>Percent Restrained</u>
Minneapolis/St. Paul	2,386	15.4
Phoenix	2,913	14.7
Atlanta	4,673	13.7
Seattle	3,578	13.2
Miami	6,256	12.5
Birmingham	4,450	11.5
New Orleans	4,509	11.1
San Diego	4,540	11.1
Chicago	4,258	10.9
Dallas	3,133	10.5
Houston	2,826	9.9
Los Angeles	4,640	9.6
San Francisco	5,325	9.2
Pittsburgh	3,352	9.0
New York	4,127	8.7
Baltimore	3,246	8.6
Providence	3,382	6.6
Boston	3,671	6.5
Fargo/Moorhead	2,381	5.0
Total	73,646	10.5

Adults observed in the front seat were observed to use safety belts in 12.0 percent of the observations while only 2.4 percent safety belt usage was observed for back seat adult passengers (Table 54). This finding was supported by the previous study.

Table 54. Passenger safety belt usage for adults by seat position.

<u>Seat Position</u>	<u>Base</u>	<u>Percent Restrained</u>
Front Seat - Center	1,176	0.7
Front Seat - Outboard	60,784	12.2
Total Front Seat	61,961	12.0
Back Seat - Driver	4,440	1.8
Back Seat - Center	875	0.8
Back Seat - Outboard	6,337	3.1
Total Back Seat	11,652	2.4
Rear (i.e., station wagons and hatchbacks)	34	2.9
Total	73,646	10.5

Study of Child Safety Seat Installation

Passenger study observations are made from curb locations, near the exit points of selected shopping malls. Due to the limited time available to make an observation from such a vantage point, the assessment of several aspects of child safety seats are difficult or impossible to observe. For example, observations of the make of safety seat, the correctness of the vehicle safety belt use and the correctness or need for tethering are difficult to make. As a result, the primary toddler safety seat observation in the passenger study is that of observing how the child is harnessed in the safety seat and whether a shield is properly used (for those safety seats designed with shields). In order to better determine the usage characteristics of child safety seats, a study was designed to provide information on safety seat installation that could not be obtained as part of the passenger study.

During the special study, 3,518 safety seats were observed in parked vehicles at selected shopping malls. The type of safety seat and the observed mode of use are shown in Table 55. Of the 483 seats observed in an infant mode (rearward facing), 357 (73.9 percent) were of the "infant-only" (non-convertible) variety. That is, the seats cannot be converted between infant and toddler modes. For infant-only seats, relatively similar numbers of the INFANT LOVE SEAT and DYN-O-MITE seats were observed. The most prominent "convertible" seat, observed in the infant mode was the STROLEE seat. STROLEE was also the most frequently observed seat in the toddler mode. CENTURY BOOSTER seats were observed in use in 26.3 percent of the booster seat observations. Overall, STROLEE safety seats were observed most often (31.5 percent).

Table 55. Types of child safety seats observed during special study
(percentage of safety seat observations
by mode is shown parenthetically).

Name/ Manufacturer	Observed Mode			All Safety Seats
	Infant	Toddler	Booster	
Infant Love Seat	182(37.7)	N/A	N/A	182(5.2)
Dyn-O-Mite	168(34.8)	N/A	N/A	168(4.8)
Trav-L-Ette	6(1.2)	N/A	N/A	0(0.0)
Other Infant Seat	1(0.2)	N/A	N/A	1(0.2)
Bobby-Mac	27(5.6)	352(12.0)	0(0.0)	379(10.8)
Century	29(4.2)	616(21.0)	27(26.3)	663(18.8)
Cosco	13(2.7)	345(11.8)	2(1.9)	360(10.2)
Questor (Kantwet)	19(3.9)	349(11.9)	0(0.0)	368(10.5)
Strolee	37(7.8)	1,058(36.1)	14(13.6)	1,109(31.5)
Kolcraft	3(0.6)	99(3.4)	14(13.6)	116(3.3)
Teddytot (Astroseat)	4(0.8)	63(2.1)	1(0.9)	68(1.9)
Welsh	0(0.0)	7(0.2)	0(0.0)	7(0.1)
Ford	0(0.0)	3(0.1)	0(0.0)	3(0.1)
Bunny-Bear	0(0.0)	3(0.1)	0(0.0)	3(0.1)
Chrysler	0(0.0)	2(0.1)	0(0.0)	2(0.1)
Other/Unknown	3(0.6)	35(1.2)	45(43.7)	83(2.4)
Totals	483(100.0)	2,932(100.0)	103(100.0)	3,518(100.0)

Within the toddler seat category, two types of systems are available for securing the safety seat to the vehicle seat; (1) securing with the safety belt only, and (2) securing with the safety belt and a tether. Of the 2,932 toddler seats, 55.6 percent of the belt only and 44.4 percent of the belt and tether systems were observed.

A total of 1,630 toddler seats were observed that require securing with safety belts only. Observations of how these seats were secured is shown in Table 56. In 57.4 percent of the observations, the safety belt was properly used to secure the toddler seat. The safety belt was observed not to be in use in 11.0 percent of the observations and improperly used 31.7 percent of the time.

Table 56. Toddler seat use characteristics by manufacturer
(for toddler seats that require securing
by only the vehicle safety belt).

<u>Manufacturer</u>	<u>Base</u>	<u>Percent Appears Correct</u>	<u>Percent Car Belt Not Used</u>	<u>Percent Car Belt Used Incorrectly</u>
Bobby Mac	262	87.7*	11.0	2.3
Century	518	47.5*	6.5	46.0
Cosco	307	45.3	13.1	41.6
Questor (Kantwet)	300	47.4	16.6	36.0
Strolee	37	75.6	13.6	10.8
Kolcraft	99	84.9	6.0	8.1
Teddytot (Astroseat)	63	62.0	6.3	31.7
Welsh	7	71.5	0.0	28.5
Bunny-Bear	3	33.4	66.6	0.0
Ford	3	33.4	66.6	0.0
Chrysler	2	0.0	100.0	0.0
Other/Unknown	29	69.0	20.6	10.4
Total	1,630	57.4	11.0	31.7

* Some safety seats require safety belt attachment around the child as opposed to direct attachment to the safety seat. These seats were coded as "Appears Correct".

For the 1,302 toddler seats that require both a safety belt and tether for proper securing, 15.3 percent were observed to be properly secured in the vehicle (see Table 57). Failure to tether the seat was the most predominant type of misuse observed. However, when a tether was used, it was used improperly in only 4.0 percent of the observations. On the otherhand, the safety belt was used in 94.4 percent of all observations (5.6 percent unused), however in over 37 percent of the observations, the safety belt was incorrectly attached to the toddler seat.

Table 57. Toddler seat use characteristics by manufacturer
(for toddler seats that require the vehicle
safety belt and tether strap).

<u>Manufacturer</u>	<u>Base</u>	<u>Percent Appears Correct</u>	<u>Percent Tether Not Used</u>	<u>Percent Tether Used In- correctly</u>	<u>Percent Belt Not Used</u>	<u>Percent Car Belt Used In- correctly</u>
Bobby-Mac	90	17.8	76.7	5.6	0.0	6.7
Century	98	18.4	74.5	5.2	0.0	5.2
Cosco	38	21.1	73.7	5.3	2.7	13.2
Questor (Kantwet)	49	61.3	8.2	8.2	4.1	26.6
Strolee	1,021	12.5	78.6	3.5	6.8	44.7
Other/Unknown	6	0.0	100.0	0.0	0.0	0.0
Total	1,302	15.3	75.5	4.0	5.6	37.7

Helmet Study Findings

During the period from November, 1982 to December, 1983, 27,020 observations were made of helmet use by operators and passengers of motorcycles and mopeds. Of 21,414 motorcycle drivers, 66.6 percent were observed wearing helmets compared to 34.7 percent for drivers of mopeds (motorized bicycle). Passengers of motorcycles and mopeds were less likely to be observed wearing helmets with 61.2 and 26.2 percent of their respective bases. Tables 58 and 59 show the helmet usage rates in each city for motorcycles and mopeds respectively.

In order to examine differences in helmet use given the existence of mandatory helmet use laws, motorcycle usage rates were stratified into a group with mandatory helmet use laws and a group with no or limited helmet laws. Table 60 shows the seven cities in which mandatory helmet laws exist. Helmet use for drivers and passengers were recorded to be 93.9 and 95.4 percent, respectively.

Table 61 lists the twelve cities with no or limited laws. Driver and passenger helmet use rates were observed to be 55.4 and 47.3 percent respectively.

The helmet use rates shown in Tables 60 and 61 were similar to those reported in the previous study.

Table 58. Helmet use for motorcycle operators and passengers.

<u>City</u>	<u>Driver Base</u>	<u>Percent Helmet On</u>	<u>Passenger Base</u>	<u>Percent Helmet On</u>
Boston	977	83.2	146	84.2
Providence	914	75.7	104	71.2
New York	1,198	84.3	135	85.2
Baltimore	1,086	77.2	165	80.0
Pittsburgh	593	98.8	95	98.9
Chicago	1,068	35.9	165	21.8
Minneapolis/St. Paul	1,310	49.2	208	35.6
Fargo/Moorhead	1,375	42.7	233	41.2
Miami	1,183	99.5	236	100.0
Atlanta	650	99.5	120	100.0
Birmingham	685	99.4	134	100.0
New Orleans	918	99.5	171	97.7
Seattle	631	69.7	63	47.6
San Francisco	1,635	56.5	322	48.8
San Diego	1,884	55.3	326	35.6
Los Angeles	1,611	61.2	334	49.7
Phoenix	1,193	47.4	200	43.0
Houston	927	52.4	192	58.9
Dallas	1,576	53.6	239	53.6
Total	21,414	66.6	3,588	61.2

Table 59. Helmet use for moped operators and passengers.

<u>City</u>	<u>Driver Base</u>	<u>Percent Helmet On</u>	<u>Passenger Base</u>	<u>Percent Helmet On</u>
Boston	34	32.4	1	100.0
Providence	24	12.5	0	--
New York	54	42.6	7	42.9
Baltimore	13	0.0	0	--
Pittsburgh	9	66.7	1	0.0
Chicago	41	29.3	1	100.0
Minneapolis/St. Paul	84	27.4	11	0.0
Fargo/Moorhead	56	21.4	9	22.2
Miami	168	41.7	16	56.3
Atlanta	60	48.3	1	100.0
Birmingham	91	31.9	4	50.0
New Orleans	104	66.3	4	75.0
Seattle	41	58.5	3	0.0
San Francisco	217	54.4	24	41.7
San Diego	401	28.9	39	12.8
Los Angeles	172	16.9	45	20.0
Phoenix	73	27.4	11	0.0
Houston	58	10.3	17	23.5
Dallas	93	24.7	31	29.0
Total	1,793	34.7	225	26.2

Table 60. Motorcycle helmet use in cities with mandatory helmet use laws.

<u>City</u>	<u>Driver Base</u>	<u>Percent Helmet On</u>	<u>Passenger Base</u>	<u>Percent Helmet On</u>
Boston	977	83.2	146	84.2
New York	1,198	84.3	135	85.2
Pittsburgh	593	98.8	95	98.9
Miami	1,183	99.5	236	100.0
Atlanta	650	99.5	120	100.0
Birmingham	685	99.4	134	100.0
New Orleans	918	99.5	171	97.7
Total	6,204	93.9	1,037	95.4

Table 61. Motorcycle helmet use in cities with no or limited helmet use laws.

<u>City</u>	<u>Driver Base</u>	<u>Helmet On</u>	<u>Passenger Base</u>	<u>Helmet On</u>
Providence	914	75.7	104	71.2
Baltimore	1,086	76.2	164	80.0
Chicago	1,068	35.9	165	21.8
Minneapolis/St. Paul	1,310	49.2	208	35.6
Fargo/Moorhead	1,375	42.7	233	41.2
Seattle	631	69.7	63	47.6
San Francisco	1,635	56.5	322	48.8
San Diego	1,884	55.3	326	35.6
Los Angeles	1,611	61.2	334	49.7
Phoenix	1,193	47.4	200	43.0
Houston	927	52.4	192	58.9
Dallas	1,576	53.6	239	53.6
Total	15,210	55.4	2,550	47.3

REFERENCES

1. Phillips, B.M., "Restraint System Usage in the Traffic Population" DOT-HS-806-424, National Highway Traffic Safety Administration, May, 1983.
2. Vindicator 84 User's Guide, Release No. 1, Highway Loss Data Institute, December, 1983.

APPENDIX A - DRIVER SAFETY BELT USAGE BY MANUFACTURER'S DIVISION AND
MODEL YEAR (1976-1984)

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Table A.1. Driver safety belt usage for American Motors by model year.

<u>Model Year</u>	<u>Base</u>	<u>Percent Belted</u>
1976	77	7.8
1977	52	9.6
1978	37	13.5
1979	41	14.6
1980	52	11.5
1981	45	8.9
1982	20	20.0
1983/1984	32	21.9
Total	336	11.6

Table A.2. Driver safety belt usage for Plymouth by model year.

<u>Model Year</u>	<u>Base</u>	<u>Percent Belted</u>
1976	114	14.9
1977	154	11.0
1978	111	18.9
1979	123	13.8
1980	72	19.4
1981	122	19.7
1982	88	11.4
1983/1984	65	7.7
Total	849	14.7

Table A.3. Driver safety belt usage for Dodge by model year.

<u>Model Year</u>	<u>Base</u>	<u>Percent Belted</u>
1976	90	13.3
1977	133	14.3
1978	142	12.0
1979	133	12.0
1980	85	16.5
1981	110	20.0
1982	90	17.8
1983/1984	74	8.1
Total	857	14.2

Table A.4. Driver safety belt usage for Chrysler by model year.

<u>Model Year</u>	<u>Base</u>	<u>Percent Belted</u>
1976	53	13.2
1977	74	6.8
1978	93	8.6
1979	116	5.2
1980	49	14.3
1981	28	17.9
1982	56	14.3
1983/1984	49	12.2
Total	518	10.0

Table A.5. Driver safety belt usage for Buick by model year.

<u>Model Year</u>	<u>Base</u>	<u>Percent Belted</u>
1976	217	13.4
1977	322	9.3
1978	314	12.1
1979	377	9.3
1980	428	13.8
1981	389	13.9
1982	396	14.1
1983/1984	245	16.7
Total	2,688	12.7

Table A.6. Driver safety belt usage for Chevrolet by model year.

<u>Model Year</u>	<u>Base</u>	<u>Percent Belted</u>
1976	617	6.3
1977	819	10.9
1978	938	11.0
1979	969	10.9
1980	835	12.1
1981	757	12.0
1982	586	11.8
1983/1984	320	15.3
Total	5,841	11.1

Table A.7. Driver safety belt usage for Cadillac by model year.

<u>Model Year</u>	<u>Base</u>	<u>Percent Belted</u>
1976	150	4.7
1977	199	7.5
1978	219	11.4
1979	253	14.2
1980	153	9.2
1981	121	9.9
1982	125	11.2
1983/1984	131	9.9
Total	1,351	10.1

Table A.8. Driver safety belt usage for Oldsmobile by model year.

<u>Model Year</u>	<u>Base</u>	<u>Percent Belted</u>
1976	279	10.8
1977	355	10.1
1978	387	8.8
1979	489	11.7
1980	458	14.2
1981	426	14.1
1982	405	16.5
1983/1984	287	12.9
Total	3,086	12.5

Table A.9. Driver safety belt usage for Pontiac by model year.

<u>Model Year</u>	<u>Base</u>	<u>Percent Belted</u>
1976	184	5.4
1977	238	12.2
1978	299	5.4
1979	318	8.5
1980	246	11.0
1981	163	12.3
1982	188	18.6
1983/1984	118	13.6
Total	1,754	10.3

Table A.10. Driver safety belt usage for Ford by model year.

<u>Model Year</u>	<u>Base</u>	<u>Percent Belted</u>
1976	505	7.5
1977	493	11.0
1978	639	10.5
1979	679	10.9
1980	474	12.2
1981	419	13.1
1982	397	15.4
1983/1984	208	19.2
Total	3,814	11.7

Table A.11. Driver safety belt usage for Mercury by model year.

<u>Model Year</u>	<u>Base</u>	<u>Percent Belted</u>
1976	68	16.2
1977	76	11.8
1978	117	8.5
1979	140	11.4
1980	65	9.2
1981	79	20.3
1982	73	19.2
1983/1984	45	8.9
Total	663	13.0

Table A.12. Driver safety belt usage for Lincoln by model year.

<u>Model Year</u>	<u>Base</u>	<u>Percent Belted</u>
1976	21	0.0
1977	33	6.1
1978	39	10.3
1979	51	5.9
1980	25	4.0
1981	27	14.8
1982	18	5.6
1983/1984	26	3.8
Total	240	6.7

Table A.13. Driver safety belt usage for Volkswagen by model year...

<u>Model Year</u>	<u>Base</u>	<u>Percent Belted</u>
1976	69	21.7
1977	120	33.3
1978	131	49.6
1979	154	42.9
1980	173	45.1
1981	140	49.3
1982	101	39.6
1983/1984	19	15.8
Total	907	41.5

Table A.14. Driver safety belt usage for Toyota by model year.

<u>Model Year</u>	<u>Base</u>	<u>Percent Belted</u>
1976	173	12.7
1977	221	15.4
1978	283	17.7
1979	294	19.0
1980	448	21.0
1981	387	23.0
1982	446	26.7
1983/1984	166	28.9
Total	2,418	21.2

Table A.15. Driver safety belt usage for Datsun/Nissan by model year.

<u>Model Year</u>	<u>Base</u>	<u>Percent Belted</u>
1976	127	14.2
1977	150	18.0
1978	213	17.8
1979	217	15.7
1980	288	17.4
1981	234	20.1
1982	265	18.1
1983/1984	109	23.9
Total	1,603	18.0

Table A.16. Driver safety belt usage for other imports by model year.

<u>Model Year</u>	<u>Base</u>	<u>Percent Belted</u>
1976	234	21.4
1977	224	19.6
1978	321	24.6
1979	444	25.2
1980	397	26.4
1981	611	26.4
1982	684	26.3
1983/1984	289	26.6
Total	3,204	25.2

APPENDIX B - DRIVER SAFETY BELT USAGE BY CAR SERIES BY
MANUFACTURER'S DIVISION

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The tables in Appendix B show driver safety belt usage for 1976-1984 model years by car series for each manufacturer. Only those models that have 50 or more observations are presented.

<u>Manufacturer/Series</u>	<u>Base</u>	<u>Percent Belted</u>
<u>American Motors</u>		
Concord	122	15.6
Pacer	56	12.5
<u>Plymouth</u>		
Fury	55	1.8
Horizon	220	22.3
Reliant	183	12.0
Volare	353	12.7
<u>Dodge</u>		
Aries	164	16.5
Aspen	308	14.6
Diplomat	71	12.7
Omni	189	16.9
<u>Chrysler</u>		
Cordoba	174	9.8
LeBaron	208	11.5
New Yorker	85	8.2

<u>Manufacturer/Series</u>	<u>Base</u>	<u>Percent Belted</u>
<u>Buick</u>		
Century	361	14.4
Electra	298	10.1
Le Sabre	402	10.4
Regal	876	11.2
Riviera	166	9.6
Skyhawk	75	21.3
Skylark	484	17.4
<u>Chevrolet</u>		
Camaro	542	7.7
Caprice	677	11.8
Cavalier	127	15.7
Celebrity	85	20.0
Chevelle	211	6.2
Chevette (Regular)	820	15.1
Citation	546	16.3
Corvette	73	9.6
Impala	502	10.4
Malibu	701	10.8
Monte Carlo	898	6.9
Monza	153	11.8
Nova	431	10.0
Vega	51	5.9

<u>Manufacturer/Series</u>	<u>Base</u>	<u>Percent Belted</u>
<u>Cadillac</u>		
Brougham	151	11.9
Deville	675	9.0
Eldorado	244	7.8
Seville	267	13.5
<u>Oldsmobile</u>		
Custom Cruiser	52	15.4
Cutlass	1,707	11.8
Delta 88	556	11.9
Ninety-Eight	327	11.9
Omega	211	15.6
Toronado	102	12.7
Ciera	81	21.0
<u>Pontiac</u>		
Bonneville	278	9.4
Catalina	76	7.9
Firebird	271	10.7
GrandPrix	480	6.3
Grand Le Mans	83	10.8
J 2000/2000	61	24.6
Le Mans	90	12.2
Phoenix	133	17.3
Sunbird	137	8.0
T 1000/1000	58	17.2

<u>Manufacturer/Series</u>	<u>Base</u>	<u>Percent Belted</u>
<u>Ford</u>		
Escort	320	19.4
Fairmont	626	14.7
Fiesta	81	18.5
Ford Wagon	93	15.1
Granada	629	8.3
LTD	431	7.9
LTD II	119	7.6
Maverick	53	7.5
Mustang	686	12.1
Pinto	263	14.1
Thunderbird	377	8.8
<u>Mercury</u>		
Capri	64	17.2
Cougar	184	10.3
Lynx	61	24.6
Marquis	102	10.8
Monarch	100	12.0
Zephyr	101	11.9
<u>Lincoln</u>		
Continental	136	6.6
Mark Series	90	5.6

<u>Manufacturer/Series</u>	<u>Base</u>	<u>Percent Belted</u>
<u>Foreign Models</u>		
Audi	193	27.4
Datsun/Nissan	1,603	18.0
Fiat	149	18.8
Honda	1,231	27.0
Mazda	386	24.9
Subaru	200	22.0
Toyota	2,418	21.2
Volkswagen Rabbit	689	46.4
Volkswagen Other	218	25.7
Volvo	361	28.8

APPENDIX C - EFFECTIVENESS OF BUZZERS VERSUS CHIMES

A special data summary was prepared to examine the relative effectiveness of buzzer and chime-equipped vehicles in increasing driver safety belt use. Table C.1 lists eight vehicle models and model years either buzzers or chimes have been installed as standard equipment. Overall, drivers of chime-equipped vehicles were observed using safety belts in 20.2 percent of the observation as compared to 12.2 percent for drivers of buzzer-equipped models. Caution, however, should be used when interpreting the results of Table C.1 due to the relatively small sample of observations.

Table C.2 shows driver safety belt use for vehicle models with buzzers. Identical manufacturers and model years to those shown in Table C.1 are provided to allow a comparison of usage rates between buzzers and chimes. Models with chimes tend to be more effective than buzzers.

Table C.1 - Driver safety belt use for cars equipped with buzzers and chimes.

<u>Manufacturer/Model</u>	<u>Buzzer</u> <u>(Model Year 1981)</u>		<u>Chime</u> <u>(Model Year 1982)</u>	
	<u>Base</u>	<u>Percent Restrained</u>	<u>Base</u>	<u>Percent Restrained</u>
GM/Olds Toronado	11	27.3	10	30.0
GM/Olds 98	<u>36</u>	<u>13.9</u>	<u>44</u>	<u>27.3</u>
GM Total	47	17.0	54	27.8
		<u>(Model Year 1982)</u>	<u>(Model Year 1983)</u>	
Ford/Crown Victoria	25	0.0	15	6.7
Ford/Mercury Brougham	10	10.0	6	0.0
Ford/Cougar	<u>15</u>	<u>13.3</u>	<u>4</u>	<u>0.0</u>
Ford Total	50	6.0	25	4.0
		<u>(Model Year 1981)</u>	<u>(Model Year 1982)</u>	
Chrysler/LeBaron	14	14.3	0	0
Chrysler/Dodge 400	0	0	0	0
Chrysler/New Yorker 5th Ave.	<u>4</u>	<u>25.0</u>	<u>20</u>	<u>20.0</u>
Chrysler Total	18	16.7	20	20.0
Total	115	12.2	99	20.2

Table C.2 - Driver safety belt use for cars equipped with buzzers.

<u>Manufacturer</u>	<u>Model Year</u>			
		<u>1981</u>		<u>1982</u>
	<u>Base</u>	<u>Percent Restrained</u>	<u>Base</u>	<u>Percent Restrained</u>
GM	1,575	12.4%	1,249	13.3%
		<u>1982</u>		<u>1983</u>
Ford	164	17.7%	135	11.9%
		<u>1981</u>		<u>1982</u>
Chrysler	21	19.0%	11	9.1%
Total	1,760	13.0%	1,395	13.1%

Note: Table C.2 prepared for cars with wheelbase greater than 101 inches, excluding those models listed in Table C.1.

APPENDIX D - DATA FORMS AND INSTRUCTIONS

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Driver Study Data Form

Printed data forms entitled "Driver Restraint Observation: Form #1" will be used in the study (Figure D.1). Fifty observations can be recorded on the front and back of the form. Use as many forms as necessary but always use a new form when you change to a new site. Send all completed forms to Goodell-Grivas, Inc. using the addressed envelopes provided at the end of each week.

General Information

The top portion of each form provides a description of observer, location, date and environmental conditions. This information is very important to the study and should be completed prior to each collection period at a location.

1. **Observer:** Write in your last name.
2. **City:** Write in the city.
3. **Day:** Circle the appropriate day of the week.
4. **Date:** Write in the month, date, and year. For example write in 11/15/82 for November 15, 1982.
5. **Area Type:** Circle the appropriate description of the area.
City - Downtown, central city area
Suburban - Heavy commercial, industrial or highly residential area outside the central city area.
6. **Location No:** Record the number shown on your site listing or map.
7. **Site:** Circle the appropriate description of primary road or freeway exit.
8. **Location:** Write in the street name on which data are collected and the direction (north, east, south, west) and name of the nearest cross-street.
9. **Roadway Conditions:** Circle the condition which best describes the road condition at the time of observation.
10. **Start Time:** Specify the hour and minutes, and circle AM or PM for the start of the collection period.
11. **End Time:** Specify the hour and minutes, and circle AM or PM for the ending of the collection period.

DRIVER RESTRAINT OBSERVATION: FORM #1

1. Observer: _____ 2. City: _____
 3. Day: Su M Tu W Th F Sa 4. Date: ____ / ____ / ____
 5. Area Type: City Suburb 6. Location No.: _____
 7. Site: Primary Road Freeway Exit
 8. Location: On _____ N E S W Of _____
 (Street Name) (Nearest X-Street)
 9. Road Conditions: Dry Wet Snow/Ice
 10. Start Time: _____ AM PM 11. End Time: _____ AM PM

No.	License number	Make (Model)	Model Code	Driver Sex 1 M 2 F	Adult Lvl. 1 Both 2 Lap 3 None	Automatic Restraint System 1 Yes 2 No	Driver and Passenger Position by Age Group			Rear of Sta. Wagon Hatchback Number of Children
							Driver	Center	Outboard	
1.										
2.										
3.										
4.										
5.										
6.										
7.										
8.										
9.										
10.										
11.										
12.										
13.										
14.										
15.										
16.										
17.										
18.										
19.										
20.										

Age Group: 1-Infant (Under 1 yr) 2-Toddler (1-4 yrs) 3-Subteen (5-12) 4-Teenager (13-19) 5-Adult (20-24) 6-Adult (25-49) 7-Adult (50 or over) 8-Child on Lap

Figure D.1. Driver study data form.

Observation Data

Complete one line on the form for each vehicle observed. Start with the second car stopped for the traffic light. Obtain an additional observation during the red light if time permits. If only one car stops at the light, observe that car.

1. License Number: The license numbers of the cars you observe are a very important part of the information you collect. By comparing the license numbers with records of the Department of Motor Vehicles (DMV's), we will be able to ascertain model year and obtain other needed information about the car observed.

Be sure to print the license number so it is both accurate and legible. Print in bold letters and numbers, i.e., DXU 613. Be careful when printing "U" and "V".

2. Make (Model): We are interested in the general make categories. For example, under the make of Chevrolet, there are several specific models such as: Caprice, Impala, BelAir, Chevelle, Nova, Vega, Camaro, Monte Carlo, and Corvette. All of these should be listed as Chevrolet. Other makes like Ford, AMC, etc., have similar categories. Models within a given make category differ in size as well as name. They may also differ in type of safety belt installation. These differences are important.

Most cars carry the model identification on the car. For these cars, you will be able to obtain the make identification by simply reading it off the car. If the make is not readily apparent, as is possible on some older or damaged cars, you will have to settle for the general car make (domestic or foreign). Where possible, we prefer a specific make category. However, if the rest of the data is good, an observation with general car model, is still usable information.

3. Model Code: At the end of the observation period or day, for each make name recorded, insert the appropriate two-digit code in the space provided. You will be provided with a list of model names and codes to assist you in the coding task. If the model name that you have recorded is not on the list, use code 29 for other domestic make and code 59 for other import make.

4. Driver Sex: Write in the code to describe the sex of the driver.

5. Observed Driver Restraint System Usage: There are only three possible code categories for describing the drivers use of shoulder harness and lap belts. These are:

Both On (Code 1)

This means that a positive observation has been made that the lap belt is across the driver's waist or lap and that the shoulder harness is over the driver's left shoulder.

Lap Belt Only (Harness Off) (Code 2)

The driver has the lap belt across the waist or lap but does not have the shoulder harness over the left shoulder. In cars that have a one-piece harness and belt, drivers who are buckled up but are not wearing the shoulder harness over the left shoulder may either have the harness under the arm or behind the back. This is not the proper way to wear the harness, and if it is in either of these positions, you should record Code 2.

In cars that have a two-piece harness and belt, the shoulder harness is a separate strap that is stored in a clip attached to the car's headliner or simply left dangling if it is not stored properly. If you observe that the shoulder harness is not being worn or not being worn properly, but that the lap belt has been buckled, you should record Code 2.

NOTE: In older model cars that have only a lap belt, record Code 2 if the driver is belted and record Code 3 if the driver is not belted. You will never use Code 1 if the car contains only a lap belt.

None (Code 3)

If the driver is not wearing either the lap belt or shoulder harness, record Code 3.

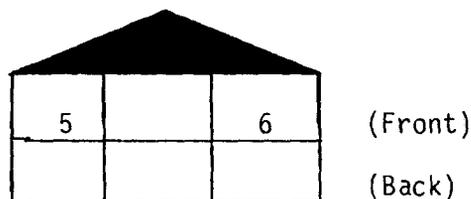
6. Automatic Restraint System: The automatic safety belt system will be found mainly in newer Volkswagon Rabbits and Jettas, Chevrolet Chevettes, and Toyota Cressidas. When observing these three makes, you will have to determine whether the belt system is an "automatic" system (Code 1) or a regular lap and shoulder combination system (Code 2). The automatic belt is designed to fit across the driver and front seat passenger each time he/she enters the car and closes the door. Each time he/she leaves the car by opening the door, the belt is designed to let the driver or passenger exit without unbuckling. When observing the type of belt system, particularly in Rabbits, Jettas, Chevettes and Toyotas, if you see that the safety belt is attached to the door or there is a buckle on the door with no belt attached to it, you can be fairly certain that the car has an automatic belt system.

An automatic shoulder harness is standard equipment in the Toyota Cressida, which is the only Toyota model which has an automatic restraint device. This vehicle also is equipped with a separate lap belt which has to be manually fastened. Automatic safety belts are also currently available in the diesel VW Rabbit and Jetta models but were discontinued as an option in the Chevrolet Chevette in 1981. Although it has been discontinued there are still some Chevettes with automatic safety belts in the traffic population.

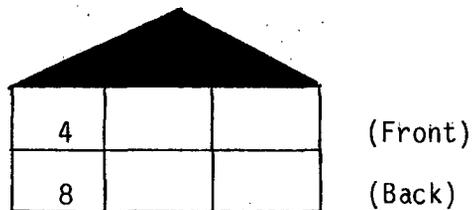
7. Driver and Passenger Position by Age Group: Record the age group code shown at bottom of the form in one of the six seat position boxes on the observation form. The six boxes are intended to illustrate the six seat positions of the passenger car with the driver side on the left, and the outboard on the right as indicated on the form.

Examples:

Adult driver (age 20-24) and adult passenger (age 25-49) on front seat:



Teen driver and adult passenger
with infant on lap in back seat
on driver's side:



The age groups codes for the driver and/or passengers are:

- | | | | |
|-----------------------------|---------------------------|----------------------------|--------------------------|
| 1 = Infant
(under 1 yr.) | 2 = Toddler
(1-4 yrs.) | 3 = Subteen
(5-12 yrs.) | 4 = Teen
(13-19 yrs.) |
| 5 = Adult
(20-24 yrs.) | 6 = Adult
(25-49 yrs.) | 7 = Adult
(50 or over) | 8 = Child on Lap |

8. Rear of Station Wagon or Hatchback: Record number of children who are riding behind the back seat of a station wagon or hatchback.

Passenger Study Data Form

Printed data forms entitled "Passenger Restraint Observation: Form #2" will be used in this study (Figure D.2). Fifty passenger observations can be recorded on the front and back of the form. Use as many forms as necessary for a study period but begin each collection period with a new form. For example, if you collect data for a two-hour period and then take a break, use a new data form to show the start and end time for the next collection period. Send all completed forms to Goodell-Grivas, Inc. on Friday every week.

General Information

The top portion of each form provides a description of observer, location, date and environmental conditions. This information is very important to the study and should be completed prior to each collection period at a location.

The general information needed is similar to that required for the Driver Study form. The exceptions are items 7 and 8. For item 7, write in the name of the shopping center shown on your list of locations. For item 8, write in the street name onto which the vehicles are exiting. If you change locations, begin a new data form.

Observation Data

Complete one line on the form for each passenger (not including the driver) observed. For example, if an observed vehicle has a driver and three passengers, three lines will be coded for the observation.

1. Total Passengers: Write total number of passengers in the car. Do not count the driver. This is only recorded once for each vehicle when recording data for the first passenger in the vehicle.
2. Age Group: Write in the age group code for each passenger. Refer to bottom of the form for a description of the age range for each group.
3. Seat: Write in the seat code number 1 for front seat, 2 for back seat, and 3 for the rear of station wagons or hatchbacks, for each passenger.

PASSENGER RESTRAINT OBSERVATION: FORM #2

1. Observer: _____ 2. City: _____
 3. Day: Su M Tu W Th F Sa 4. Date: ____ / ____ / ____
 5. Area Type: City Suburb 6. Location No.: _____
 7. Shopping Center: _____
 8. Exit To: _____
 (Street Name)
 9. Road Conditions: Dry Wet Snow/Ice
 10. Start Time: _____ AM PM 11. End Time: _____ AM PM

No.	Total Passengers	Age Group*	Seat		Position	Passenger Restraint	Infant Seat	Toddler Seat	Booster Seat
			1 Front	2 Back					
1.									
2.									
3.									
4.									
5.									
6.									
7.									
8.									
9.									
10.									
11.									
12.									
13.									
14.									
15.									
16.									
17.									
18.									
19.									
20.									

*Age Group: 1 - Infant (Under 1 yr) 2 - Toddler (1-4 yrs) 3 - Subteen (5-12) 4 - Teenager (13-19) 5 - Adult (20-24) 6 - Adult (25-49) 7 - Adult (50 or over)

Figure D.2. Passenger study data form.

4. **Position:** Write in the position code number 1, if passenger is located on the driver side, 2 for center, or 3 for outboard seat for each passenger.

5. **Passenger Restraint:** Write in the code number showing the restraint system observed for each passenger.

Lap/Shoulder Belt (Code 1)

This means that a positive observation has been made that the lap belt is across the passengers waist or lap and that the shoulder harness is over the passengers shoulder.

Lap Belt Only (Shoulder Harness Off) (Code 2)

The passenger has the lap belt across the waist or lap but does not have the shoulder harness over the shoulder.

In cars that have a one-piece harness and belt, passengers who are buckled up but are not wearing the shoulder harness over the shoulder may either have the harness under the arm or behind the back. This is not the proper way to wear the harness, and if it is in either of these positions, you should record Code 2.

If you observe that the shoulder harness is not being worn or not being worn properly, but that the lap belt has been buckled, you should record Code 2.

NOTE: In older model cars that have only a lap belt, you record Code 2 if the passenger is belted and record Code 7 if the passenger is not belted. You will never use Code 1 if the car contains only a lap belt.

Infant Safety Seat (Code 3)

Infant safety seats are generally designed for infants less than 1 year old, and are designed to face the rear of the vehicle. This position allows the back of the infant to absorb the force of a crash. Infant safety seats are equipped with a five-point harness (straps) to secure the infant to the safety seat and have provisions for using the auto safety belt system to secure the seat to the car. The principle for the 5-point

system in an infant safety seat is the same. The 5-point system includes a pair of straps that over the infants shoulders, lap belts and a crotch strap. Note that no infant safety seats are designed to face forward. There are also convertible safety seats which can be used for toddlers or can be used in the infant position (rearward facing). Consult the list of infant seats to determine if the safety seat is approved by NHTSA. You are not responsible for identifying the specific type (brand) of safety seat but you should be able to distinguish between a NHTSA approved safety seat and an unapproved seat which is referred to as a flimsy seat (refer to Code 6).

Toddler Safety Seats (Code 4)

Toddler safety seats are generally designed for small children between the ages of 1-4 years old. Toddler seats face forward and most have a five-point harness system (straps) to secure the toddler to the seat. Some models use a shield or a combination of a harness system and shield to secure the toddler. All models have provisions for securing the safety seat to the car through auto safety belts. Some models have a tether strap which is to be attached to the rear safety belt or deck lid to prevent pivoting (tipping forward). Also consult the list of NHTSA approved toddler safety seats provided to you. Again, you are not responsible for identifying the exact type of safety seat in this particular study, but you should be aware of the models that have tether straps and shields.

Booster Seats (Code 5)

Boosters are strong, firm seats which usually have no back. Booster seats designed for use in a vehicle have a device to secure an auto lap belt. They must be used with a lap belt and some type of upper-body harness. This can be either the auto lap/shoulder safety belt or the auto lap belt used with the two-strap harness sold with the booster seat, which is fastened with a tether strap.

Unsafe Seat (Flimsy Seat) (Code 6)

There are several types of seats that are erroneously considered as safety seats for infants and small children. These seats are intended for use in the home and do not provide occupant protection in the event of an accident. The seats are usually made of thin plastic and are usually equipped with thin plastic straps. They have no provisions for attachment to the car using safety belts. The seats are not designed to withstand the stresses and impacts associated with an accident and are not NHTSA approved for use as safety seats in autos. There are also some older type infant/toddler seats originally designed to be used in the car which may still be used, but are not dynamically tested nor provide ample protection in the event of a collision. Any child seat with "hooks" that are designed to hang over the car seat or child seats that have attachments that fit between the car seat cushion and back should be considered an unsafe seat. Devices such as car beds are also not acceptable as a child safety seat and should be given a Code 6.

None (Code 7)

If the passenger is not wearing either the lap belt or shoulder harness, not placed in a safety seat, record Code 7.

Child on Lap (Code 8)

If an infant, toddler or subteen is observed being held in the arms of another passenger use a code 8 signifying child on lap. Do not use a code 8 for the adult holding the child, instead use code 1, 2 or 7 depending on the adults restraint usage.

6. Child Safety Seat Use: Indicate the code that describes the way in which the infant, toddler or booster safety seat is used. Provide a code in the column specifically related to whatever type device being observed only when Passenger Restraint observation (Item 6) indicates that an infant or child is being transported in a NHTSA approved infant (Code 3), toddler (Code 4), or booster (Code 5) safety seat. Since the codes vary based on the restraint system used, each will be described separately.

Infant Seat

This column should only be used when an infant safety seat is being used (Code 3 for Passenger restraint) or when an unused infant safety seat is observed.

Harness/Car Belt (Code 1)

Use this code if the infant is in an approved infant safety seat, and is restrained by a 5-point harness (straps), the auto safety belt is properly used, and the seat is rearward facing.

Harness Only (Code 2)

Use this code if the infant is properly restrained in the seat by a 5-point system but the safety seat is not secured by the auto safety belt.

Car Belt Only (Code 3)

Use this code if the infant safety seat is secured by the auto safety belt, but the infant is not restrained by the harness on the safety seat.

No Harness/Car Belt (Code 4)

Use this code if the infant is in an approved infant safety seat, but the seat is not secured by an auto safety belt and the infant is not restrained by the harness on the safety seat.

Facing Wrong Direction (Code 5)

Use this code if the infant safety seat is observed being used facing forward or sideways.

Unsure (Code 6)

If you can not make a position verification on the use of the safety seat, use code 6.

Unused Seat (Code 7)

If there is an infant in the vehicle not using a safety seat and the car also contains an unused seat, use a code 7.

Toddler Seat

This column should only be used when a toddler seat is being used (Code 4 for Passenger Restraint) or when an unused toddler safety seat is observed. When observing toddler safety seats, you need not assess the use of the auto safety belt to secure the toddler seat to the car. Therefore, the only possible toddler seat codes are 1, 4, 5, 6 and 7.

Harness/Shield (Code 1)

Use this code if the toddler is in an approved toddler safety seat and is restrained by a 5-point harness or shield (if applicable). Some toddler safety seats come equipped with an arm rest. The use of an arm rest does not provide any additional protection to the child, and does not replace the use of the harness.

No Harness/Shield (Code 4)

Use this code if the toddler is in an approved toddler safety seat, but is not restrained by the harness or shield.

Other/Unsafe (Code 5)

Use this code if an unsafe use of a toddler safety seat is observed (with exception of the auto safety belt). This predominately pertains to the tether strap not being used for a seat requiring a tether strap (i.e., Child Love Seat).

Unsure (Code 6)

If you can not make a positive verification on the use of the harness system or shield, use Code 6.

Unused Seat (Code 7)

If there is a toddler in the vehicle not using a safety seat and the car also contains an unused toddler seat, use a Code 7.

Booster Seat

This column should only be used when a booster seat is being used (Code 5 for Passenger Restraint) or an unused booster seat is observed.

Harness/Lap Belt (Code 1)

If a toddler/subteen is observed in a booster seat and the seat is secured by the auto lap belt and the child is using a two-strap harness, fastened by a tether strap, then use this code.

Shouder/Lap Belt (Code 2)

If a toddler/subteen is observed in a booster seat and the seat and child is secured by a combination lap and shoulder harness, use Code 2. If the shoulder harness on a one-piece safety belt system is placed behind the child and only the lap belt restrains the seat use Code 3.

Lap Belt Only (Code 3)

Use this code if the child is in an approved booster seat that is secured by the auto safety belt, but is not restrained by a shoulder belt or a harness/tether device.

No Harness/Car Belt (Code 4)

Use this code if the child is in an approved booster seat, but the seat is not restrained by a lap belt and is not restrained by a shoulder harness or a harness/tether device.

Other/Unsafe (Code 5)

Use this code if an other unsafe use of a booster seat is observed. Please indicate what the unsafe usage was.

Unsure (Code 6)

If you can not make a positive verification on the use of the safety device, use Code 6.

Unused Seat (Code 7)

If there is a toddler or subteen (up to age 8) in the vehicle not in a safety seat, and the car also contains an unused booster seat, use this code.

Comments

You are encouraged to briefly describe any unsafe safety seat usage or explain difficulty in viewing the usage of the safety seat. This is particularly important if a code 5 or 6 is used to describe the use of a child safety seat. This information will not be coded but will be used to verify coding of unusual or confusing observations.

Special Study Data Form

Printed data forms entitled "Special Study - Child Safety Seats - Form A" will be used in this study (Figure D.3). Fifty observations can be recorded on the front and back of the form. Use as many forms as necessary during each hour of observation. Send all completed forms to Goodell- Grivas, Inc. using the addressed envelopes provided at the end of each week.

General Information

The top portion of the form provides a description of observer, location, date, and environmental conditions. The general information is identical to the Passenger Restraint Observation Form except that Number 8, "Exit To", has been deleted since you will be observing parked cars in the lot. Begin a new sheet for each Special Study period. Use more than one sheet if necessary.

Observation Data

Complete one line on the form for each infant, toddler or booster safety seat observed. If a vehicle has two child safety seats in it, two lines of data will be coded for the observation.

1. **Seat:** Write in the vehicle seat code number 1 for front seat, 2 for back seat, and 3 for the rear of station wagons or hatchbacks, for the location of each child safety seat.

2. **Position:** Write in the position code number 1 if the safety seat is located on the driver side, 2 for center, or 3 for out-board position. If a seat is located in the rear of a station wagon or a hatchback, do not code in the position.

3. **Tether:** (Code for Toddler Seats Only), write in the code describing the tether requirement and its use. The codes are as follows:

SPECIAL STUDY - CHILD SAFETY SEATS: FORM A

1. Observer: _____ 2. City: _____
 3. Day: Su M Tu W Th F Sa 4. Date: ____ / ____ / ____
 5. Area Type: City Suburb 6. Location No.: _____
 7. Shopping Center: _____
 8. Road Conditions: Dry Wet Snow/Ice
 9. Start Time: _____ AM PM 10. End Time: _____ AM PM

No.	Seat 1 Front 2 Back 3 Rear	Position 1 Driver side 2 Center 3 Outboard	Tether	Belting Attached to Seat	Shield Required	Infant or Toddler Seat Model/Comments
			1 Tether required properly used 2 Tether required improperly used 3 Tether required not used 4 tether not required	1 Proper 2 Improper 3 No 4 Not required	1 Yes 2 No	
1.						
2.						
3.						
4.						
5.						
6.						
7.						
8.						
9.						
10.						
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18.						
19.						
20.						

Figure D.3. Child safety seat study data form.

Tether Required, Properly Used (Code 1)

This means that the toddler seat has been positively identified as one that requires the use of a tether and that the tether is properly secured. Proper use of a tether is as follows; if the toddler seat is in the front seat the tether strap must be attached to the back seat lap belt; if the toddler seat is in the back seat the tether must be bolted to the rear deck lid or bolted to the rear of a station wagon or hatchback at a proper angle (approximately 45 degrees or greater).

Tether Required, (and used but) Improperly Used (Code 2)

This means that a positive identification has been made as to the need for a tether but that there is something improper about the use of the tether (this code implies that the tether is secured in some way but that the securing is improper). Please explain the improper use whenever the Code 2 is used.

Tether Required But Not Used (Code 3)

This means that a toddler seat has been positively identified as requiring a tether but that the tether is not used at all. For example the Child Love Seat requires a tether. If this seat model was observed without the tether strap used it would receive a Code 3.

Not Required (Code 4)

This means that a toddler seat has been positively identified as a seat that does not require a tether strap.

4. **Belting Attached to Seat:** Write in the code describing the belting of the toddler seat to the vehicle seat. The codes are as follows:

Proper (Code 1)

This indicates that the toddler seat has been positively identified as one in which the vehicle's belt (lap or lap/shoulder combination) should be wrapped around the undercarriage of the toddler seat in order to hold the seat in-place. This is in contrast to seats that use the vehicle's belt system (that goes around the toddler) to hold the child and the seat in place. The coding for this type of seat will be explained later in the section.

Improper (Code 2)

This means that a toddler seat has been positively identified as one that requires the vehicles belt system to be attached to the undercarriage of the toddler seat to hold it in place, but there is something improper about the usage of the vehicle belt system. The most common misuse will probably be misplacement of the vehicle belt. Use the illustrations in the manual to note where and how the belting system should be attached.

No (Code 3)

This means that a toddler seat has been positively identified as one that requires the vehicles belt system to be attached to the undercarriage but that the belting is not used, i.e., the toddler seat is not restrained and is simply setting on the vehicle seat or is laying in the rear of a station wagon or hatchback. This observation would receive a Code 3.

Not Required (Code 4)

This code deals with child safety seats in which the child must first be placed in the seat and then the safety seat is belted around the child (or sometimes the child and shield) and attached to the vehicle seat. Examples of this type of safety seat are: Bobby Mac Two-In-One, Bobby Mac Deluxe, and the Century (GM) Child Love Seat.

5. **Shield Required:** (Code for Toddler Seats Only) Write in the code to describe whether or not a shield is required for proper use of the toddler seat. Code a 1 for yes or a 2 for no. Refer to the manual for illustrations of the toddler seats that require a shield. The Ford Tot Guard is an example of a seat which has a shield which is permanently attached to the seat and would always receive a Code 1. The Bobby-Mac Deluxe toddler seat requires a shield and would be coded as a 1. Note: The shield may or may not be in the car so be certain about the type of safety seat. Don't assume that the safety seat is not a shield-type seat just because you do not see a shield.
6. **Model:** Write in the brand name and model of the observed toddler or infant seat. The model names can be found in your manual along with the illustrations of the infant/toddler seats. You may be able to read the name directly off the seat. Be sure to indicate if the seat is a toddler or infant seat. If a convertible seat is being used as an infant seat, code it as an infant seat.

When identifying a seat, please try to be as specific as possible. For example when you identify a Bobby Mac Deluxe seat, do not simply write down "Bobby Mac", but also include the model description (Deluxe) or model code number (i.e., Strollee 599). This information will assist us in checking if the seat requires a tether or shield.

Helmet Study Data Form

Printed data forms entitled "Motorcycle/Moped Observation: Form #3" will be used in this study (Figure D.4). Fifty-five observations can be recorded on the front and back of the form.

General Information

Complete the top portion of the form to indicate the city, day and date and your name. The other general information is not applicable since you will be conducting this study throughout the course of the day. Use as many forms as necessary but start with a new form at the beginning of each day.

Observation Data

Complete one line on the form for each motorcycle/moped observation.

1. Driver: Code 1 if driver is wearing helmet.
 Code 2 if driver is not wearing helmet.

2. Passenger: Code 1 if passenger is wearing helmet.
 Code 2 if passenger is not wearing helmet.
 (If no passenger, don't enter any code number.)

3. Type of Cycle: Leave third column blank if observing a
 motorcycle.
 Code 1 if observing a mopad or motorbike.

MOTORCYCLE - MOPED OBSERVATION: FORM #3

1. Observer: _____ 2. City: _____
 3. Day: Su M Tu W Th F Sa 4. Date: ____ / ____ / ____

No.	Driver 1 - Helmet On 2 - Helmet Off	Passenger 1 - Helmet On 2 - Helmet Off (If no Passenger, Leave Blank)	Type of Cycle 1 - Moped or Motorbike (If Motorcycle Leave Blank)
1.			
2.			
3.			
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Figure D.4. Helmet study data form.