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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 January through December, 1985, are the basis for this report. The four studies and their findings are as follows:

1. Driver Safety Belt Use: A total of 96,371 drivers stopped for traffic signals were observed during the 12 month period. 23.3 percent were observed to wear safety belts during the last data collection period (July to December).
2. Passenger Safety Belt and Child Safety Seat Use: Findings from this study are based on 86,500 passengers observed at shopping mall entrances and exists. Child safety seat usage (for infants and toddlers) increased throughout 1985, reaching a high in the second half (July to December) of 56.2 percent. The percent of toddlers, subteens, teens, and adults wearing safety belts during the second half was observed to be 9.3, 25.1, 12.3, and 21.6 percent, respectively.
3. Safety Seat Installation Characteristics: Observations were recorded on a total of 3,460 child safety seats in vehicles parked at shopping malls and 89.4 percent were observed in the toddler mode. For toddler seats that require securing by only the vehicle safety belt, 70.2 percent were used correctly. However, only 6.9 percent of toddler seats that require the safety belt and tether were used correctly.
4. Helmet Use by Operators and Passengers of Motorcycles and Mopeds: Driver and passenger helmet use was observed to be 65.5 and 48.6 percent, respectively, for 9,127 motorcycle observations. Helmet use for both drivers and passengers in cities with mandatory helmet use laws was observed to be 99.6 percent, while helmet use in cities with no or limited helmet use laws was observed to be 52.4 percent for drivers and 32.4 percent for passengers.

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SUMMARY

Four observational studies for various segments of the traffic population were continued in 19 cities throughout the nation. 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 January through December, 1985.

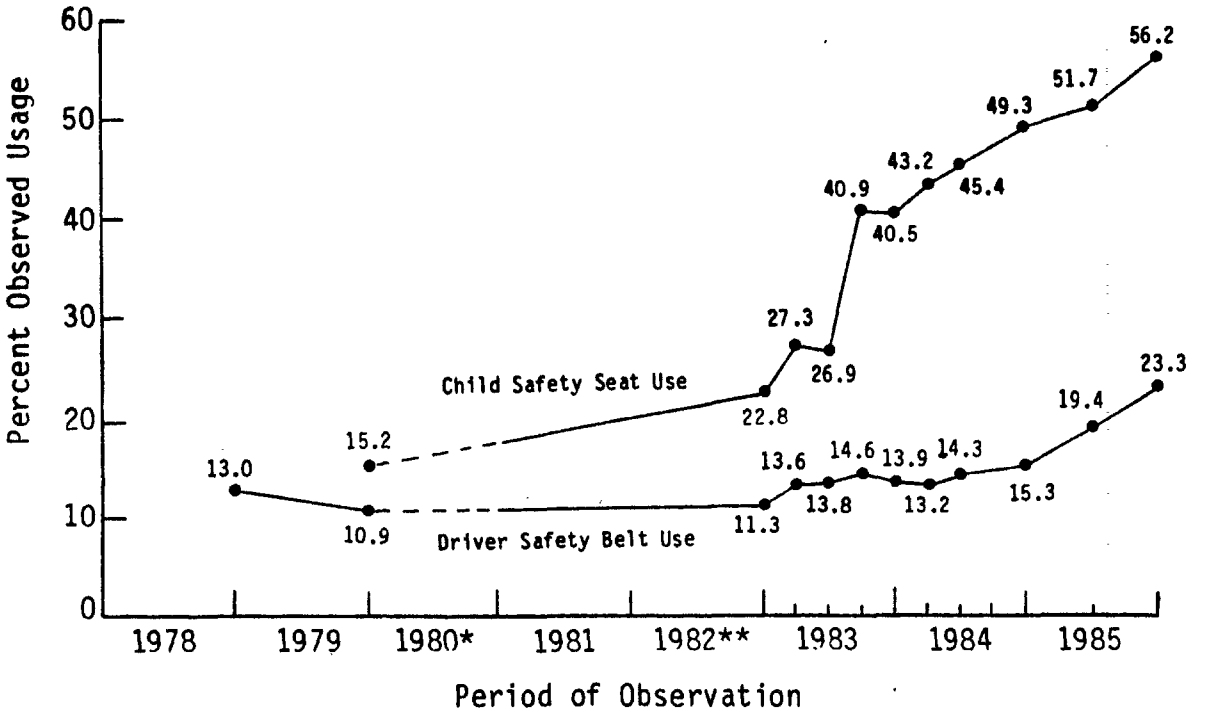
Driver Study Findings

Based on a total of 96,371 observations of drivers stopped for traffic signals, the following major findings associated with driver safety belt usage were:

- Driver safety belt usage increased to 23.3 percent during the second half of calendar year 1985 (Figure 1).
- Female driver safety belt usage was consistently higher than male driver safety belt usage (23.9 percent versus 19.2 percent).
- Drivers of imported vehicles were observed to have a higher safety belt usage rate than drivers of domestic vehicles (30.1 percent versus 17.5 percent).
- Driver safety belt usage was observed to be highest among the 25 to 49 year age group.
- Driver safety belt usage increased as vehicle size decreased.
- Driver safety belt usage increased with vehicle model year.

Passenger Study Findings

A total of 86,500 passengers were observed at shopping mall entrances/exits during a separate study. Figure 1 shows the upward trend in use of child safety seats during 1985, with usage increasing to 56.2 percent. By the end of 1985, 66.3 percent of infants and 56.1 percent of toddlers were observed travelling in a child safety seat. Passenger safety belt use during the same period (July to December) was observed to be 9.3 percent for toddlers, 25.1 percent for subteens, 12.3 percent for teens, and 21.2 percent for adults.



* Data not collected in 1980.
** Represents data collected in 1981 and 1982.

Figure 1. Driver safety belt and child safety seat use.

Safety Seat Installation Findings

A total of 3,460 safety seats were observed in vehicles parked at shopping malls. Seats installed in the infant mode were observed in 245 of the observations while 3,093 seats were observed in the toddler mode. The remaining 122 observations involved booster seats. For toddler seats that require installation using only the vehicle safety belt, 70.2 percent appeared to be installed properly and seat belts were used incorrectly in 23.9 percent of the observations. For toddler seats that require belting and tethering, only 6.9 percent were observed to be correctly installed. Tethers were not used or used incorrectly in over 90 percent of observations, while incorrect belting was observed for 34.0 percent of the seats.

Helmet Study Findings

Of the 9,127 motorcycle observations, driver and passenger helmet use was observed to be 65.5 and 48.6 percent, respectively. Helmet use for drivers and passengers of 535 moped observations was observed to be 47.9 and 24.0 percent, respectively.

INTRODUCTION

This report presents the annual findings based on field observations collected over a 12-month period from January through December, 1985. During this period the use of occupant restraints including both safety belts and child safety seats was observed for over 182,000 drivers and passengers in over 157,000 passenger vehicles in 19 cities across the nation. Also during this time, helmet usage was recorded for operators and passengers of over 9,000 motorcycles.

Study Objective

The objective of this study was 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).
- Booster 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 26-month period from November, 1984 through December, 1986 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 26-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 in Figure 2.

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 purposely 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 6-month period. Each city requires approximately 13.5 days of data collection for comple-

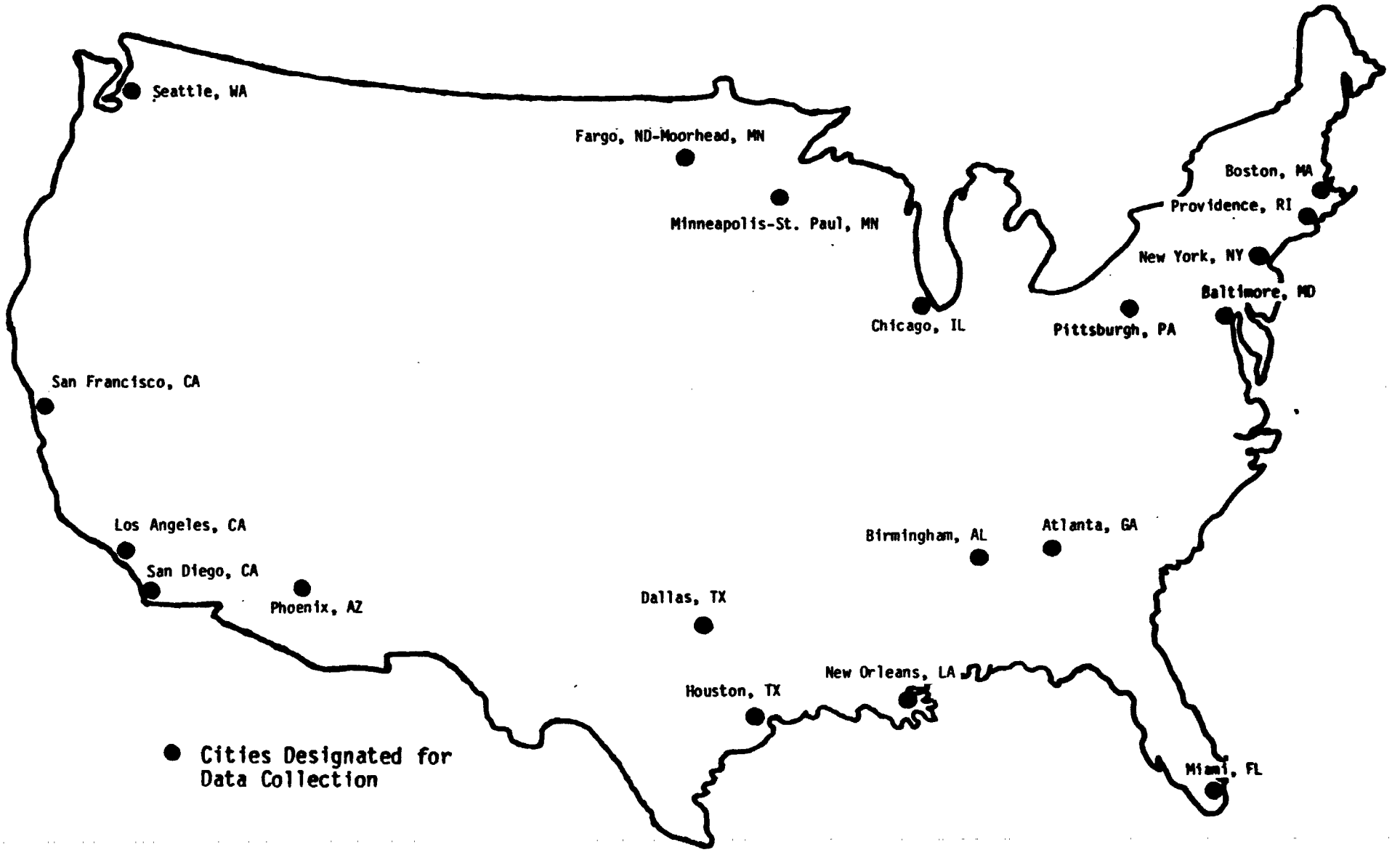


Figure 2. Location of the 19 cities for restraint usage observation.

tion, 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

The data collection forms and procedures used in this study are identical to those used in the previous study. The data forms and instructions for their completion are provided in Appendix C.

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 six-month data collection period, 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 require 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 four 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 six months. Each observer has 4 to 5 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 1985, 12 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 are reviewed. Accuracy checks consist 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 January through December, 1985.

Driver Study Findings

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.

It should be understood that the following summaries include data collected in two cities with mandatory safety belt laws (i.e., New York and Chicago) A mandatory law was in effect in New York during both data collection periods in 1985. Illinois enacted a similar mandatory safety belt law, effective July 1, 1985. Therefore, only data collected in Chicago during the second half was influenced by the Illinois law.

Safety Belt Usage Trends

Annual driver safety belt usage rates from previous NHTSA studies show a clear upward trend beginning in 1984 (see Figure 1). The highest annual rate (21.4 percent) was observed in 1985. This driver safety belt usage rate of 21.4 percent consisted of 20.4 percent for lap and shoulder belt use and 1.0 percent for lap belt use only.

Safety Belt Use by City and Observation Period

In 1985, driver safety belt usage for the 19 cities was 21.4 percent. Driver safety belt usage rates by city and observation period are shown in Table 1. Annual usage rates ranged from a high of 46.3 percent in New York to a low of 11.1 percent in Fargo/Moorhead (Table 1). The rank ordering of city usage rates shown in Table 1 are similar to those obtained in the 1981-82 study (1), the 1983 study (2), and the 1984 study (3).

Table 1. Driver safety belt usage by city and observation period.

City	First Half		Second Half		Total	
	Base	Percent Restrained	Base	Percent Restrained	Base	Percent Restrained
New York	1,816	53.1	2,071	40.3	3,887	46.3
Seattle	2,630	31.3	2,747	33.8	5,377	32.6
San Diego	2,707	25.6	2,650	28.5	5,357	27.0
Phoenix	1,985	22.8	2,885	29.0	4,870	26.5
Chicago	2,570	15.4	3,292	34.5	5,862	26.1
Minn./St. Paul	2,706	25.6	2,618	25.4	5,324	25.5
San Francisco	2,924	21.0	2,682	28.0	5,606	24.4
Dallas	1,969	18.7	2,174	25.3	4,143	22.2
Los Angeles	3,987	15.6	3,100	25.2	7,087	19.8
Pittsburgh	2,475	18.9	2,579	19.9	5,054	19.4
Atlanta	2,577	17.3	3,040	20.5	5,617	19.0
Baltimore	1,745	20.2	2,268	16.3	4,013	18.0
Boston	2,567	14.3	2,287	19.1	4,854	16.6
Houston	2,759	14.3	2,639	18.5	5,398	16.3
Birmingham	2,211	13.5	2,570	18.3	4,781	16.1
Miami	2,863	13.4	2,254	15.4	5,117	14.3
Providence	1,838	13.5	2,137	14.3	3,975	13.9
New Orleans	2,734	13.0	3,007	13.2	5,741	13.1
Fargo/Moorhead	2,104	9.8	2,204	12.4	4,308	11.1
Totals	47,167	19.4	49,204	23.3	96,371	21.4

Safety Belt Use by Region

Driver safety belt usage rates for the five data collection regions are shown in Table 2. The Mid-Atlantic region exhibited the highest rate. However, the 27.1 percent usage rate in the Mid-Atlantic region does include New York, a city with a mandatory safety belt law. Therefore, caution should be exercised when comparing regional usage rates due to the impact of mandatory safety belt laws.

Table 2. Driver safety belt usage by region.

Region	Base	Percent Restrained
New England	8,829	15.4
Mid-Atlantic	12,954	27.1
Southeast	21,256	15.6
Southwest	9,541	18.9
Northcentral	15,494	21.7
West	28,297	25.6
Total	96,371	21.4

Safety Belt Use by Vehicle Model Year

License plate numbers recorded during the driver study for the period January through August, 1985 were submitted to the various state departments of motor vehicles (DMV's) for the purpose of obtaining vehicle information. A total of 61,068 license plate numbers were submitted to 15 states DMV's. The DMV's returned 35,349 vehicle records which were processed with the "Vindicator" program by the Highway Loss Data Institute of Washington, D.C.(4). Valid vehicle information for 26,778 vehicles (including vehicle make, model, model year, and size) were obtained for the model years 1967-1986 (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 January, 1985 and August, 1985. Overall, 20.7 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 1976-1986 can be found in Appendix A.

Table 3. Driver safety belt usage by model year.

Model Year	Base	Percent Restrained
1967	113	2.7
1968	124	5.7
1969	202	8.9
1970	301	9.3
1971	394	4.6
1972	567	7.4
1973	831	9.4
1974	923	14.4
1975	947	14.5
1976	1,523	14.6
1977	2,105	15.6
1978	2,415	16.8
1979	2,671	18.0
1980	2,321	21.3
1981	2,137	26.7
1982	2,183	27.0
1983	2,518	29.1
1984	3,423	28.2
1985/86	1,080	27.0
Total	26,778	20.7

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 84.6 percent. Manual system usage varied from 7.9 percent for separate systems to 21.8 percent for combination systems. The usage rates for both passive and separate safety belt systems were slightly lower than 1984 rates. However, the usage rate for combination systems increased 7.3 percent from 1984. 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.

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

Safety Belt System Type	Base	Percent Restrained
Automatic (Passive) System	91	84.6
Lap/Shoulder Combination (Model Years 1974-1986)	24,153	21.8
Lap/Shoulder Separate (Model Years 1968-1973)	2,419	7.9

A summary of the specific vehicle types for which passive safety belt systems are an option (based on all driver data collected in 1985) is shown in Table 5. It can be seen that Toyota experiences the highest rates of passive safety belt usage with 91.9 percent while the Chevette has the lowest at 63.9 percent.

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

Vehicles Make/System Type	Base	Percent Restrained
Chevette - Automatic	61	63.9
Chevette - Manual	1,383	16.8
VW Rabbit/Jetta - Automatic	331	70.7
VW Rabbit/Jetta - Manual	1,025	30.7
Toyota - Automatic	234	91.9
Toyota - Manual	5,865	31.8

Safety Belt Use by Driver Sex

Observed safety belt use stratified by driver sex is shown in Table 6. As in the 1984 study, female drivers are more likely to wear safety belts. In addition, the difference in usage rates between driver sex is in similar proportions to the 1984 data. That is, the 1984 study rates were 12.7 percent for males versus 17.0 percent for females (a difference of 4.3 percent), whereas, the current data indicates 19.2 percent for males versus 23.9 percent for females (a difference of 4.7 percent).

Table 6. Driver safety belt usage by driver sex.

Driver Sex	Base	Percent Restrained
Male	58,508	19.2
Female	37,863	23.9
Total	96,371	21.4

Safety Belt Use by Driver Age

Table 7 shows that safety belt usage is highest among the 25 to 49 year age group (22.7 percent) and is the only "above average" group. The relative rankings between age groups are similar to 1984 results.

Table 7. Driver safety belt usage by age group.

Age Group	Base	Percent Restrained
Under 20	3,043	15.5
20-24	9,988	20.0
25-49	60,763	22.7
50 or over	22,577	19.1
Total	96,371	21.4

Safety Belt Use by Vehicle Make (Domestic Versus Import) and Vehicle Size

Using data generated from the Vindicator program, driver safety belt usage was stratified by vehicle make and vehicle size as shown in Tables 8 and 9. The four vehicle size categories presented in these tables correspond to the following wheelbase measurements:

Subcompact - wheelbase less than 101 inches
Compact - wheelbase 101-111 inches
Intermediate - wheelbase 112-120 inches
Full size - wheelbase greater than 120 inches

Table 8 shows the relationship between safety belt usage, vehicle make and vehicle size when all model years are included. This table shows that drivers of smaller size vehicles (i.e., subcompacts and compacts) are much more likely to wear safety belts than drivers in larger vehicles. In addition, drivers of imported vehicles were observed to be more likely to wear safety belts than their domestic vehicle counterparts. Further investigation of this table reveals that approximately 85 percent of the imported vehicles observed were subcompacts. In fact, imported supcompacts accounted for over 20 percent of all observations. This finding, along with the high usage rate (28.5 percent) associated with these vehicles, as compared to other vehicles, demonstrates the impact that imported subcompacts have on driver usage rates.

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

	Vehicle Make		
Vehicle Size	Domestic	Import	Total
Subcompact	21.4% (3,736)	28.5% (5,827)	25.7% (9,563)
Compact	19.4% (7,572)	40.9% (916)	21.8% (8,488)
Intermediate	15.1% (6,306)	20.3% (64)	15.1% (6,370)
Full Size	11.9% (2,354)	* (3)	11.9% (2,357)
Total	17.5% (19,968)	30.1% (6,810)	20.7% (26,778)

*The usage rate for this category was not reported due to the small sample size.

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

When only newer model cars (1976-1986) are considered, similar but slightly higher usage rates were observed. This is shown in Table 9.

Table 9. Driver safety belt usage by vehicle make and vehicle size for 1976-1986 model years.

	Vehicle Make		
Vehicle Size	Domestic	Import	Total
Subcompact	22.3% (3,469)	31.2% (4,994)	27.5% (8,463)
Compact	20.7% (6,555)	41.1% (840)	23.0% (7,395)
Intermediate	16.4% (5,163)	20.3% (64)	16.5% (5,227)
Full Size	14.9% (1,288)	* (3)	15.0% (1,291)
Total	19.2% (16,475)	32.5% (5,901)	(22,376)

*The usage rate for this category was not reported due to the small sample size.

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

Safety Belt Use by Vehicle Manufacturer

Driver safety belt use by vehicle manufacturer for all model years (based on data from the Vindicator program) is shown in Table 10. Drivers of Honda vehicles were observed wearing safety belts in 35.6 percent of the observations; the highest of any manufacturer. Drivers of Chrysler products experienced the highest usage rates of the domestic vehicle manufacturers.

When the older model vehicles were removed from the data summaries, Volkswagen and Chrysler showed the highest driver usage rates for import and domestic manufacturers, respectively (Table 11).

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

Vehicle Manufacturer	Base	Percent Restrained
AMC	226	15.8
Chrysler	2,260	20.3
Ford	4,786	14.8
GM	12,891	18.1
VW	922	26.6
Toyota	1,834	31.7
Datsun/Nissan	1,280	25.4
Honda	932	35.6
Other Imports	1,607	32.2
Total	26,778	20.7

Table 11. Driver safety belt usage by vehicle manufacturer for 1976 - 1986 model years.

Vehicle Manufacturer	Base	Percent Restrained
AMC	173	15.6
Chrysler	1,710	22.8
Ford	3,867	16.5
GM	10,920	19.8
VW	524	37.4
Toyota	1,672	33.4
Datsun/Nissan	1,108	27.4
Honda	910	36.0
Other Imports	1,492	32.6
Total	22,376	22.7

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 12 and 13 illustrate driver safety belt usage rates for all model years (based on the Vindicator program outputs) and for newer model years (1976 - 1986), respectively. Table 12 shows that the Chrysler and Dodge divisions of Chrysler Corporation have the highest usage rates while the Lincoln division of Ford Motor Company has the lowest among the three largest domestic manufacturers. Table 13 shows similar usage rates for the subset of newer model years from 1976 to 1986. Divisions showing significantly higher usage rates for the newer models as compared to all models include Plymouth and Dodge. Driver safety belt usage by manufacturer's division and model year (1976-1986) are provided in Appendix A and safety belt usage by car series can be found in Appendix B.

Table 12. Driver safety belt usage by manufacturer's division for all model years.

Manufacturer's Division	Base	Percent Restrained
• Chrysler		
Chrysler	475	20.6
Dodge	746	20.8
Plymouth	762	19.7
• Ford		
Ford	3,588	15.1
Lincoln	329	10.0
Mercury	745	15.6
• GM		
Buick	2,425	19.3
Cadillac	1,364	16.6
Chevrolet	4,717	16.7
Oldsmobile	2,648	20.3
Pontiac	1,520	18.8

Table 13. Driver safety belt usage by manufacturer's division for 1976 - 1986 model years.

Manufacturer's Division	Base	Percent Restrained
• Chrysler		
Chrysler	422	21.3
Dodge	517	25.0
Plymouth	512	22.9
• Ford		
Ford	2,817	17.1
Lincoln	287	10.1
Mercury	657	16.4
• GM		
Buick	2,131	20.6
Cadillac	1,163	18.1
Chevrolet	3,794	18.7
Oldsmobile	2,342	21.7
Pontiac	1,285	20.2

Note: Manufacturer's division for which fewer than 20 vehicles were observed, are not reported in this table.

Safety Belt Use By Time of Day

Table 14 compares 1984 and 1985 usage rates stratified by the four daily data collection periods described earlier. It can be seen that in 1985, usage rates among the four time periods are similar. This finding is not consistent with the 1984 study which showed drivers are more likely to use safety belts during the evening commute.

Table 14. Driver safety belt usage by time period.

	1984		1985	
Time Period	Base	Percent Restrained	Base	Percent Restrained
7 - 10 a.m.	32,007	14.3	26,461	21.2
10 a.m. - 1 p.m.	38,312	13.6	23,821	22.2
1 - 4 p.m.	40,954	13.9	32,603	21.0
4 - 7 p.m.	18,934	17.3	13,486	21.1
Total	130,207	14.4	96,371	21.4

Safety Belt Use By Site Characteristics

Driver safety belt usage rates stratified by site type and area type, are shown in Tables 15 and 16, respectively. Table 15 indicates that driver safety belt usage is higher on freeways than on non-freeway facilities. This characteristic was found in the 1984 study.

Table 15. Driver safety belt usage by site type.

Site Type	Base	Percent Restrained
Primary Road	69,177	20.2
Freeway Exit	27,194	24.4
Total	96,371	21.4

Safety belt use in city areas versus suburbs is shown in Table 16. 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 show that drivers are more likely to use safety belts in the city. Study findings in 1984 also showed this, however, the difference in rates between city and suburb areas was less pronounced.

Table 16. Driver safety belt usage by area type.

Area Type	Base	Percent Restrained
City	55,504	22.4
Suburb	40,867	20.0
Total	96,371	21.4

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. Results show that 72.0 percent of the 96,371 vehicles observed were occupied by only the driver. Table 17 shows the passenger occupancy rates for all observed vehicles.

Table 17. Occupancy for vehicles observed in the driver study.

Passenger Occupancy Per Vehicle	Observed	Percent of Total
0	69,434	72.0
1	21,704	22.5
2	3,647	3.8
3	1,238	1.3
4 or more	348	0.4
Total	96,371	100.0

Table 18 shows the age distribution of passengers as observed in the driver study. Of the 96,371 vehicles observed, less than one percent had an infant passenger. The percentage of cars with passengers in the four other age categories were: toddlers 2.2 percent; subteens 3.1 percent; teens 2.7 percent; and adults 22.7 percent. These percentages represent the distribution of passengers in the traffic population as opposed to passenger distribution obtained in the passenger study, where observers are instructed to concentrate primarily on vehicles with toddlers and infants at shopping centers. In the driver study, the observers sample from the second car stopped for a traffic light.

Table 18. Percent of cars with passengers by age group in the driver study.

Age Group	Percent of Vehicles
Infants (less than 1 year)	0.2
Toddlers (1-4 years)	2.2
Subteens (5-12 years)	3.1
Teens (13-19 years)	2.7
Adults (20 and older)	22.7

Table 19 shows the occupancy rate for each seating position by age group. In 63.1 percent of the vehicles observed the driver was categorized in the 25-49 year age group. This age group also occupied the front-outboard position most often (12.1 percent).

Table 19. Occupancy by seat position and age group for vehicles in the driver study.

Age Group	Front Driver		Front Center		Front Outboard		Back Driver		Back Center		Back Outboard	
	No.	Percent of Total	No.	Percent of Total	No.	Percent of Total	No.	Percent of Total	No.	Percent of Total	No.	Percent of Total
Infant	0	--	34	0.0	69	0.1	15	0.0	15	0.0	15	0.0
Toddler	0	--	263	0.3	511	0.5	600	0.6	460	0.5	639	0.7
Subteen	0	--	199	0.2	1,431	1.5	665	0.7	580	0.6	814	0.8
Teen	3,043	3.2	88	0.1	2,115	2.2	310	0.3	137	0.1	479	0.5
Adult 20-24	9,988	10.4	56	0.1	2,466	2.6	120	0.1	25	0.0	236	0.2
Adult 25-49	60,763	63.1	126	0.1	11,693	12.1	503	0.5	100	0.1	867	0.9
Adult 50 or over	22,577	23.4	38	0.0	7,134	7.4	302	0.3	40	0.0	637	0.7
Two occupants	0	--	4	0.0	187	0.2	16	0.0	7	0.0	23	0.0
Empty	0	--	95,563	99.2	70,765	73.4	93,840	97.4	95,007	98.6	92,661	96.2
Total	96,371	100.0	96,371	100.0	96,371	100.0	96,371	100.0	96,371	100.0	96,371	100.0

Analysis of Key Variables

During an eight-month period from January through August, 1985 a total of 61,068 driver observations were recorded. The license plate data from these records were then sent to various state DMV's as the first step in a process to obtain a "verified" subset of driver safety belt usage data. Data received from the various DMV's were sent to the Highway Loss Data Institute where they were analyzed with the "Vindicator" program (4). The 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 resultant verified data base consisted of 26,778 observations recorded over the eight-month period. As previously discussed, a total of 61,068 driver observations were made during the eight-month period and submitted to various state DMV's. However, data submitted to a number of states (i.e., Arizona, Georgia, Maryland, Minnesota, North Dakota, and Pennsylvania), totalling 18,842 observations, were not returned in time to be included as part of the verified data base. Therefore, the 26,778 observations represent 63.4 percent of the 42,226 observations made in 13 of the 19 cities (i.e., excluding Phoenix, Atlanta, Baltimore, Minneapolis, Fargo/Moorhead, and Pittsburgh). The remaining 36.6 percent were not considered verified data due to a variety of reasons including data collector errors in recording vehicle license plate numbers, inaccuracies/inconsistencies in state DMV data base, and inconsistencies between observed vehicle characteristics and vehicle characteristics contained in the DMV data bases.

In the 1981-82 study (1), the 1983 study (2), and the 1984 study (3), 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 1984 study and current study, the above listed variables (excluding data collection region due to the limited number of cities involved) are presented in a series of pairwise summaries, in a fashion similar to the 1984 study. For each of Tables 20 through 29 a summary of the major findings are provided in the following sections. The findings of these summaries further support the predictability of these variables, excluding data collection region. These summaries do not reflect the entire verified data base of 26,778 observations, since this base includes data on pre-1976 model year vehicles. The following summaries are based on a total of 22,376 verified observations for vehicle model years 1976-1986. The driver safety belt usage rate for this data base was 22.7 percent compared to 21.4 percent for the 96,371 observations that represent the entire 1985 driver study data base.

Driver Safety Belt Usage by Model Year and Driver Sex (Table 20)

- Driver safety belt usage increased consistently among each sex as model year increased.
- Safety belt usage for female drivers of 1976-1986 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 1984 study.

Driver Safety Belt Usage by Model Year and Driver Age (Table 21)

- Driver safety belt usage increases were relatively consistent among each age group as vehicle model year 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 similar to the findings of the 1984 study.

Driver Safety Belt Usage by Model Year and Make (Table 22)

- Driver safety belt usage generally increased 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 1984 study.

Driver Safety Belt Usage by Model Year and Vehicle Size (Table 23)

- Driver safety belt usage generally increased as model year increased for all vehicle sizes.
- Driver safety belt usage generally increased as vehicle size decreased for each model year.
- The findings of this comparison are similar to the findings of the 1984 study.

Table 20. Driver safety belt usage by model year (1976-1986) and driver sex.

Driver Sex	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985/86	Total
Male	13.4% (967)	14.3% (1,320)	16.2% (1,442)	17.1% (1,577)	19.3% (1,328)	24.2% (1,198)	24.3% (1,220)	27.4% (1,495)	27.6% (2,054)	24.2% (681)	21.1% (13,282)
Female	16.7% (556)	17.8% (785)	17.8% (973)	19.4% (1,094)	24.0% (993)	29.9% (939)	30.4% (963)	31.6% (1,023)	29.2% (1,369)	31.8% (399)	25.1% (9,094)
Total	14.6% (1,523)	15.6% (2,105)	16.8% (2,415)	18.0% (2,671)	21.3% (2,321)	26.7% (2,137)	27.0% (2,183)	29.1% (2,518)	28.2% (3,423)	27.0% (1,080)	(22,376)

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

Table 21. Driver safety belt usage by model year (1976-1986) and driver age.

Driver Age	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985/86	Total
19 or under	14.3% (35)	12.5% (32)	15.0% (40)	3.2% (31)	22.9% (35)	20.0% (20)	34.6% (26)	38.9% (18)	29.6% (27)	40.0% (5)	20.1% (269)
20-24	13.6% (176)	12.7% (205)	17.1% (216)	14.6% (239)	19.6% (225)	23.5% (183)	24.1% (174)	30.2% (169)	25.6% (215)	20.5% (78)	19.8% (1,880)
25-49	13.6% (988)	15.1% (1,402)	17.5% (1,586)	18.1% (1,729)	22.7% (1,503)	28.8% (1,481)	27.6% (1,516)	30.4% (1,743)	28.9% (2,460)	29.1% (772)	23.6% (15,180)
50 or over	18.5% (324)	18.9% (466)	14.8% (573)	19.6% (672)	18.1% (558)	21.4% (453)	25.7% (467)	24.7% (588)	26.5% (721)	21.8% (225)	21.2% (5,047)
Total	14.6% (1,523)	15.6% (2,105)	16.8% (2,415)	18.0% (2,671)	21.3% (2,321)	26.7% (2,137)	27.0% (2,183)	29.1% (2,518)	28.2% (3,423)	27.0% (1,080)	(22,376)

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

Table 22. Driver safety belt usage by model year (1976-1986) and make.

Make	Model Year 1976	1977	1978	1979	1980	1981	1982	1983	1984	1985/86	Total
Domestic	12.7% (1,269)	14.2% (1,761)	13.9% (1,919)	15.8% (2,135)	17.8% (1,638)	23.7% (1,460)	22.5% (1,407)	24.0% (1,649)	26.2% (2,460)	20.7% (777)	19.2% (16,475)
Import	24.4% (254)	23.0% (344)	28.0% (496)	26.7% (536)	29.7% (683)	33.2% (677)	35.3% (776)	38.8% (869)	33.4% (963)	43.2% (303)	32.5% (5,901)
Total	14.6% (1,523)	15.6% (2,105)	16.8% (2,415)	18.0% (2,671)	21.3% (2,321)	26.7% (2,137)	27.0% (2,183)	29.1% (2,518)	28.2% (3,423)	27.0% (1,080)	(22,376)

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

Table 23. Driver safety belt usage by model year (1976-1986) and vehicle size.

Vehicle Size	Model Year 1976	1977	1978	1979	1980	1981	1982	1983	1984	1985/86	Total
Subcompact	16.7% (390)	21.2% (410)	24.7% (644)	23.4% (770)	25.8% (953)	30.1% (896)	30.5% (1,098)	32.9% (1,144)	28.3% (1,670)	28.5% (488)	27.5% (8,463)
Compact	18.0% (372)	17.7% (344)	15.4% (860)	16.6% (990)	18.8% (929)	25.2% (844)	25.5% (672)	28.7% (855)	31.4% (1,095)	30.0% (434)	23.0% (7,395)
Intermediate	12.6% (499)	13.5% (1,095)	13.0% (672)	15.3% (767)	16.3% (375)	20.6% (321)	19.5% (339)	21.9% (448)	23.6% (569)	14.1% (142)	16.5% (5,227)
Full Size	10.7% (262)	12.9% (256)	11.7% (239)	13.9% (144)	18.8% (64)	29.0% (76)	24.3% (74)	18.3% (71)	18.0% (89)	18.8% (16)	15.0% (1,291)
Total	14.6% (1,523)	15.6% (2,105)	16.8% (2,415)	18.0% (2,671)	21.3% (2,321)	26.7% (2,137)	27.0% (2,183)	29.1% (2,518)	28.2% (3,423)	27.0% (1,080)	(22,376)

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

Driver Safety Usage by Vehicle Make and Driver Sex (Table 24)

- 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 similar to the findings from the 1984 study.

Driver Safety Belt Usage by Vehicle Make and Driver Age (Table 25)

- Driver safety belt usage among imports was higher than restraint usage among domestic cars for each age group.
- On a total basis, the age group of 25 to 49 experienced the highest driver safety belt usage.
- The findings of this comparison are similar to the findings from the 1984 study.

Driver Safety Belt Usage by Vehicle Make and Vehicle Size(Table 26)

- 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 with each vehicle make.
- The findings of this comparison are similar to the findings from the 1984 study.

Table 24. Driver safety belt usage by vehicle make and driver sex.

(1976-1986 model years)

	Vehicle Make		
Driver Sex	Domestic	Import	Total
Male	18.4% (9,941)	29.2% (3,341)	21.1% (13,282)
Female	20.5% (6,534)	36.8% (2,560)	25.1% (9,094)
Total	19.2% (16,475)	32.5% (5,901)	 (22,376)

Table 25. Driver safety belt usage by vehicle make and driver age.

(1976-1986 model years)

	Vehicle Make		
Driver Age	Domestic	Import	Total
19 or under	11.2% (143)	30.2% (126)	20.1% (269)
20-24	14.3% (1,185)	29.4% (695)	19.8% (1,880)
25-49	19.6% (10,726)	33.3% (4,454)	23.6% (15,180)
50 or over	19.9% (4,421)	30.4% (626)	21.2% (5,047)
Total	19.2% (16,475)	32.5% (5,901)	 (22,376)

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

Table 26. Driver safety belt usage by vehicle make and vehicle size.

(1976-1986 model years)

	Vehicle Make		
Vehicle Size	Domestic	Import	Total
Subcompact	22.3% (3,469)	31.2% (4,994)	27.5% (8,463)
Compact	20.7% (6,555)	41.1% (840)	23.0% (7,395)
Intermediate	16.4% (5,163)	20.3% (64)	16.5% (5,227)
Full Size	14.9% (1,288)	* (3)	15.0% (1,291)
Total	19.2% (16,475)	32.5% (5,901)	(22,376)

*The usage rate for this category was not reported due to the small sample size.

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

Driver Safety Belt Usage by Vehicle Size and Driver Sex (Table 27)

- Driver safety belt usage for each sex generally 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 similar to the findings from the 1984 study.

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

- Driver safety belt usage for each age group 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 similar to the findings from the 1984 study.

Driver Safety Belt Usage by Driver Sex and Driver Age (Table 29)

- 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.
- The findings of this comparison are similar to the findings from the 1984 study.

Table 27. Driver safety belt usage by vehicle size and driver sex.

(1976-1986 model years)

Driver Sex	Vehicle Size: Subcompact	Compact	Intermediate	Full Size	Total
Male	25.7% (4,756)	21.8% (4,284)	15.9% (3,388)	13.2% (854)	21.1% (13,282)
Female	29.9% (3,707)	24.8% (3,111)	17.5% (1,839)	18.3% (437)	25.1% (9,094)
Total	27.5% (8,463)	23.0% (7,395)	16.5% (5,227)	15.0% (1,291)	(22,376)

Table 28. Driver safety belt usage by vehicle size and driver age.

(1976-1986 model years)

Driver Age	Vehicle Size: Subcompact	Compact	Intermediate	Full Size	Total
19 or under	25.8% (167)	15.1% (53)	7.0% (43)	0.0% (6)	20.1% (269)
20-24	24.1% (1,072)	16.0% (512)	11.3% (256)	10.0% (40)	19.8% (1,880)
25-49	28.5% (6,154)	24.0% (5,026)	16.0% (3,233)	14.0% (767)	23.6% (15,180)
50 or over	25.5% (1,070)	22.3% (1,804)	18.3% (1,695)	17.2% (478)	21.2% (5,047)
Total	27.5% (8,463)	23.0% (7,395)	16.5% (5,227)	15.0% (1,291)	(22,376)

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

Table 29. Driver safety belt usage by driver sex and driver age.

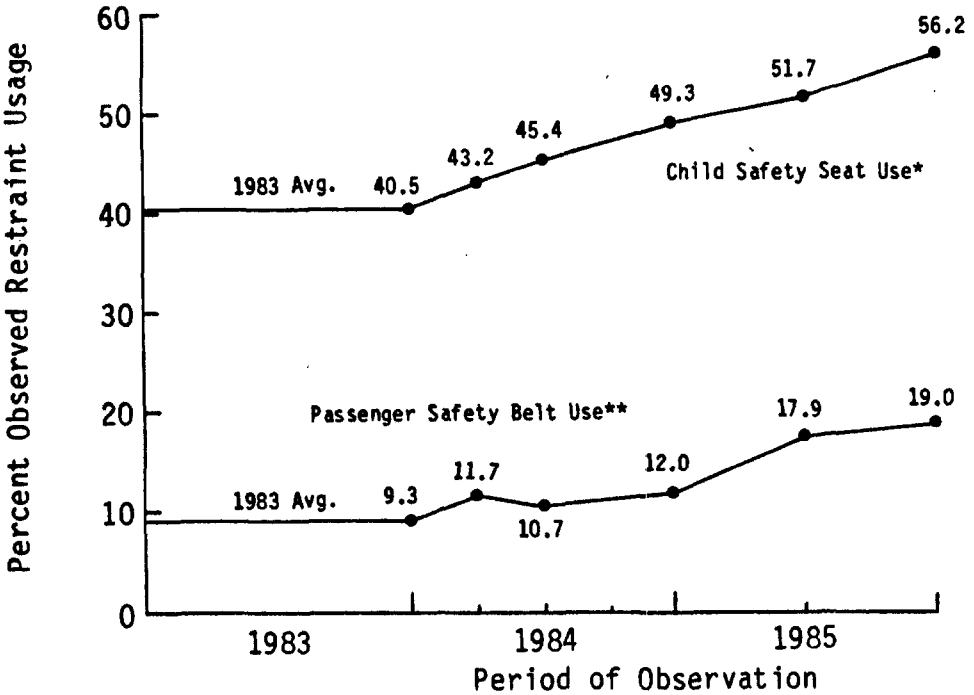
(1976-1986 model years)

	Driver Sex		
Driver Age	Male	Female	Total
19 or under	17.5% (166)	24.3% (103)	20.1% (269)
20-24	16.5% (1,131)	24.8% (749)	19.8% (1,880)
25-49	22.0% (8,556)	25.8% (6,624)	23.6% (15,180)
50 or over	20.7% (3,429)	22.3% (1,618)	21.2% (5,047)
Total	21.1% (13,282)	25.1% (9,094)	(22,376)

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

Passenger Study Findings

A total of 86,500 passengers were observed in 61,305 vehicles during 1985. 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, since this observation is relatively difficult, classification of children may not be accurate for all observations. Other age categories included teens (13-19 years old) and adults (20 years and older). Passenger safety belt and child safety seat use (children age 4 and under) are shown by calendar year for 1983, by quarter for 1984 and by half for 1985 in Figure 3. The 1985 percentages contained in Figure 3 were obtained for all age categories from the bi-annual summaries presented in Appendix D. The highest child safety seat usage rate, 56.2 percent was observed in the second half (July through December) of 1985, based on 6,152 observations. The second half child safety seat usage rate is comprised of 65.9 percent for infants (594 observations) and 55.1 percent for toddlers (5,558 observations). Passenger safety belt use in the second half of 1985 was observed to be 19.0 percent based on 43,859 observations. It should be understood that a mandatory safety belt law was in effect in New York for both data collection periods in 1985 and a similar law was in effect in Illinois during the second half of 1985. Therefore, the 19-city passenger safety belt use summaries presented in this chapter include data collected in two cities with mandatory safety belt laws (i.e., New York City and Chicago).



*Comprised of children age 4 and under (i.e., toddlers and infants).
**Comprised of passengers over 1 year of age (i.e., excluding infants).

Figure 3. Observed use of passenger restraint system over time.

Table 30 summarizes 1985 passenger restraint system use for the various age groups. Observed safety belt use for subteens was 23.3 percent in 1985, compared to 13.5 percent in 1984. This increase of nearly 10 percent may be attributable to secondary effects of child restraint laws.

Table 30. Passenger restraint system use by age group.

Age Group	Base	Safety Seat	Safety Belt	Total
Infant	1,173	66.4	1.3	67.7
Toddler	11,615	52.6	9.3	61.9
Subteen	11,740	1.4	23.3	24.7
Teen	11,428	N/A	12.7	12.7
Adult	50,544	N/A	20.8	20.8

The total passenger restraint use (safety seat and safety belt) by age group for the years 1983, 1984, and 1985 are presented in Table 31. This table shows that restraint use for each age group has increased over the past two years, with the most dramatic increases noted in the toddler, subteen, and adult age categories. Detailed summaries of the passenger study observation are provided in the next sections for each age group.

Table 31. Passenger restraint use by age group and year.

	1983		1984		1985	
Age Group	Base	Percent	Base	Percent	Base	Percent
Infant	1,869	60.4	1,493	66.9	1,173	67.7
Toddler	13,978	43.1	16,873	51.7	11,615	61.9
Subteen	14,041	8.9	14,346	14.7	11,740	24.7
Teen	10,937	7.0	13,575	7.2	11,428	12.7
Adult	73,646	10.5	61,789	13.0	50,544	20.8

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
- Infant/convertible safety seat
- Unsafe seat (home/feeder seat)
- No restraint

A total of 1,173 infants were observed in the passenger study. Of this total, 66.4 percent were observed in approved safety seats. Of the 394 infants not observed in safety seats, unused safety seats were observed in 80 (20.3 percent) of the observations. In addition, 28.8 percent of infants observed were held on passengers' laps. Unsafe (unapproved) seats were observed in 1.1 percent of the observations. Table 32 summarizes infant observations.

Table 32. Methods of restraining infants.

Type of Restraint	Number	Percent
Infant/Convertible Seat	779	66.4
Safety Belt	15	1.3
None or Unsafe Seats	379	32.3
On Lap	338	28.8
Unrestrained	28	2.4
Unsafe Seat	13	1.1
Total	1,173	100.0

If an infant was observed in an infant-only safety seat, use of the safety seat harness and car belt to secure the safety seat in the vehicle was recorded. The assessment of correct/incorrect belt use could be made accurately for observations involving an infant-only seat since the car belt crosses in front of the infant to secure the child seat. If the infant was observed to be properly harnessed and the seat appeared to be belted and facing toward the rear of the vehicle, the restraint condition was classified as "Appears Correct". If either improper harnessing, belting or positioning was observed, the condition was classified as "Obviously Incorrect". If an infant was observed in a convertible safety seat, use of the harness was recorded. However, use of the car belt to secure the safety seat in the vehicle could not be recorded due to the difficult nature of this observation.

Table 33 shows infant safety seat usage by city. Overall 39.1 percent of all infants were observed to be correctly harnessed in an approved safety seat.

Table 33. Infant safety seat usage by city.

City	Base	Percent In Safety Seat	Percent Appears Correct
Seattle	50	80.0	68.0
Fargo/Moorhead	29	79.3	17.2
Baltimore	72	76.4	68.1
San Diego	50	74.0	42.0
Boston	37	73.0	43.2
Birmingham	91	72.5	42.9
Pittsburgh	40	72.5	30.0
Phoenix	33	69.7	30.3
Chicago	139	69.1	36.0
Atlanta	68	67.6	39.7
Providence	47	66.0	55.3
Dallas	47	63.8	44.7
Miami	71	63.4	40.8
New Orleans	124	62.9	32.3
Minneapolis/St. Paul	41	58.5	31.7
Houston	55	56.4	34.5
San Francisco	73	56.2	26.0
Los Angeles	74	55.4	21.6
New York	32	46.9	40.6
Total	1,173	66.4	39.1

A comparison with the 1984 study results indicates no change in the percentage of infants in safety seats. That is, 66.4 percent of infants were observed in safety seats in the 1984 study and in the current study.

Table 34 shows the characteristics of infants observed in safety seats. For the 779 infants observed in safety seats, 58.9 percent were observed to be correctly harnessed (and belted for infant-only seats). The harness was not used in 8.4 percent of the observations, while nonuse of the car belt was observed 20.4 percent of the time. In addition, 14.0 percent of the safety seats were observed forward facing. These findings support the conclusion that parents/guardians seem to understand the importance of using the harness more so than securing the child seat or facing the seat rearward. Table 35 shows the correct usage of infants observed in safety seats by year (1983 through 1985).

Table 34. Characteristics of infants observed in safety seats.

Safety Seat Usage	Number	Percent
Correctly Used	459	58.9
No Harness	13	1.7
No Belt	107	13.7
No Harness or Belt	52	6.7
Forward Facing	109	14.0
Unsure	39	5.0
Total	779	100.0

Table 35. Correct usage of infants observed in safety seats by year.

Year	Base	Percent Appears Correct
1983	1,130	67.9
1984	991	57.0
1985	779	58.9

Table 36 shows that infants were more commonly transported in the front seat, with the front seat outboard position being the most likely position. Table 36 also shows that an infant in the back seat is more likely to be in an approved safety seat and properly transported in the seat than infants observed in the front seat. This phenomenon was also found in 1984.

Table 36. Safety seat usage for infants by seat position.

Seat Position	Base	Percent Observed in Safety Seat	Percent Appears Correct
Front Seat - Center	130	83.1	39.2
Front Seat - Outboard	611	54.0	35.0
Total Front Seat	741	59.1	35.8
Back Seat - Driver	122	79.5	44.3
Back Seat - Center	105	85.7	48.6
Back Seat - Outboard	198	75.3	43.9
Total Back Seat	425	79.1	45.2
Rear (for station wagons & hatchbacks)	7	71.4	28.6
Total	1,173	66.4	39.1

Toddlers (Ages 1 to 4 Years)

Toddler observations consisted of recording the same types of data as collected for infants. However, the correct usage of toddler safety seats could not include an assessment for the belting of the seat to the vehicle, due to the difficult nature of this observation. Correct usage of toddler seats was based solely on the proper use of the harness and shield (for seats requiring shields). In addition, some children who were classified as toddlers, were observed in booster seats. Booster seat observations were recorded as correct when either a harness/lap belt or shoulder/lap belt* system was properly used.

A total of 11,615 toddlers were observed during the passenger study. Of these, 6,115 (52.6 percent) were observed in either a toddler seat or booster seat. Of the 5,500 toddlers that were not in safety seats, unused safety seats were observed in 7.7 percent of the vehicles. Table 37 summarizes the toddler observations.

Table 37. Methods of restraining toddlers.

Type of Restraint	Number	Percent
Approved Toddler Seat	5,741	49.4
Approved Booster Seat	374	3.2
Safety Belt	1,083	9.3
None or Unsafe Seats	4,417	38.0
On Lap	1,040	9.0
Unrestrained	3,375	29.1
Unsafe Seats	2	0.0
Total	11,615	100.0

A comparison of the above findings with those of 1984 indicates an increase in the percentage of toddlers in safety seats. Safety seat usage increased from 44.3 to 52.6 percent. Also, an increase was observed in the use of safety belts by toddlers from 7.4 percent to 9.3 percent and only two unsafe seats were observed in 1985, as compared to 33 in 1984.

Table 38 shows the type of restraint usage by toddlers and the percentage of usage by city. Overall, 41.5 percent of observed toddlers were correctly harnessed and shielded (for seats requiring shields) in a child safety seat.

*Includes booster seats observed with a shield.

Table 38. 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 Appears Correct In Booster Seats	Percent Observed In Safety Seats
Baltimore	539	4.6	85.3	73.8	0.2	0.2	85.5
Providence	620	5.5	69.5	57.7	0.0	- -	69.5
Miami	513	5.8	68.6	50.5	0.2	0.2	68.8
Chicago	677	5.3	65.9	51.0	2.5	0.7	68.4
Seattle	546	8.6	61.9	58.6	6.0	3.8	67.9
Atlanta	520	8.8	59.6	40.6	4.2	1.3	63.8
New Orleans	702	9.8	54.1	37.5	8.1	5.1	62.3
San Diego	619	12.4	54.9	49.9	6.9	3.2	61.9
New York	622	7.1	59.0	47.4	0.2	0.0	59.2
Boston	528	10.6	57.2	48.7	1.1	0.4	58.3
Birmingham	457	6.1	53.4	35.4	3.1	1.3	56.5
Pittsburgh	741	17.8	38.7	33.9	7.0	0.8	45.7
Houston	657	10.0	36.7	27.7	1.5	0.2	38.2
San Francisco	902	8.6	35.0	32.4	2.8	1.1	37.8
Minneapolis/St.Paul	842	13.2	32.9	31.4	4.5	1.7	37.4
Phoenix	465	11.4	34.0	25.6	3.2	0.9	37.2
Los Angeles	639	6.9	34.4	27.9	2.7	1.3	37.1
Dallas	511	9.6	27.4	18.2	1.4	0.0	28.8
Fargo/Moorhead	515	12.0	25.6	21.4	2.9	1.0	28.5
Total	11,615	9.3	49.4	40.2	3.2	1.3	52.6

Table 39 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". Overall, harness/shield use was observed to be 81.3 percent in 1985 for toddlers observed in toddler safety seats. Table 40, which presents harness/shield use by year, shows an increase in correct usage by approximately 3 percent per year since 1983.

Table 39. Characteristics of toddlers observed in toddler safety seats.

Toddler Seat Usage	Number	Percent
Harness/Shield	4,667	81.3
No Harness or Shield	835	14.5
Unsure	239	4.2
Total	5,741	100.0

Table 40. Correct usage of toddlers observed in toddler seats by year.

Year	Base	Percent Harness/Shield
1983	4,977	75.0
1984	7,060	78.0
1985	5,741	81.3

Table 41 summarizes the observations of toddlers in approved booster seats. Of the 374 toddlers observed in booster seats, 39.3 percent were recorded as correct.

Table 41. Characteristics of toddlers observed in booster seats.

Booster Seat Usage	Number	Percent
Correctly Used	147	39.3
Harness/Lap Belt	45	12.0
Shoulder/Lap Belt*	102	27.3
Lap Belt Only	168	44.9
No Harness/Belt	55	14.7
Unsure	4	1.1
Total	374	100.0

*Includes booster seats observed with a shield.

The relationship between seating position and safety belt/seat use is summarized in Table 42 (see page 44). Toddlers were observed transported in the back seat in over two-thirds of the 11,615 observations. 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; 64.3 percent in back compared to 25.8 percent in the front seat. Similarly, correct usage was high for toddlers positioned in the back seat. This phenomenon was also reported in 1984.

Subteens (Ages 5 to 12 Years)

A total of 11,740 subteens were observed in the 19 cities during the passenger study. Use of the booster seats were observed in approximately 0.9 percent of the cases. Safety belt use for this age group was found to be 23.3 percent. This compares to 13.5 percent in 1984. Table 43 shows safety belt usage by city for the subteen age group.

Table 43. Passenger safety belt usage by city for subteens.

City	Base	Percent Restrained
Baltimore	361	44.9
Seattle	843	35.7
New York	464	30.8
San Diego	728	26.9
Boston	549	26.4
San Francisco	691	26.0
Providence	388	26.0
Pittsburgh	826	24.9
Chicago	844	24.3
Phoenix	538	22.5
Minneapolis/St. Paul	671	21.8
Atlanta	829	20.4
Miami	377	19.9
Birmingham	546	19.6
Los Angeles	487	18.9
New Orleans	838	18.3
Dallas	623	14.1
Fargo/Moorhead	564	13.8
Houston	573	10.8
Total	11,740	23.3

Table 42. Safety seat/belt usage by seat position for toddlers.

Seat Position	Base	Percent Observed Using Safety Belt	Percent Observed In Toddler Seats	Percent Harnessed/ Shielded In Toddler Seats	Percent Observed In Booster Seats	Percent Appears Correct In Booster Seats	Percent Observed In Safety Seats
Front Seat - Center	829	6.8	16.5	12.5	1.7	0.2	18.2
Front Seat - Outboard	2,514	16.6	23.9	19.5	4.3	2.9	28.2
Total Front Seat	3,343	14.1	22.1	17.8	3.6	2.3	25.8
Back Seat - Driver	2,606	10.6	59.5	49.5	3.8	0.9	63.4
Back Seat - Center	2,263	3.8	57.6	46.4	2.3	0.7	60.0
Back Seat - Outboard	3,238	7.6	65.1	52.5	3.0	1.0	68.1
Total Back Seat	8,107	7.5	61.2	49.8	3.1	0.9	64.3
Rear (i.e., station wagons* and hatchbacks)	165	1.2	23.6	20.0	1.2	0.6	24.8
Total	11,615	9.3	49.4	40.2	3.2	1.3	52.6

*Includes nine (9) passenger station wagons with folding rear seats.

Note: The percentages shown in a particular row reflect the corresponding base in that row.

Table 44 shows subteen safety belt usage by seating position. The current study indicates that the majority of subteens were observed in back seat positions. The 1984 study reported the same finding. Comparisons of safety belt usage did, however, indicate different findings. In the current study, there is about a 12 percent difference between front and back seat safety belt usage for subteens. In the 1984 effort, the difference is much less; only 4.1 percent.

Table 44. Passenger safety belt usage for subteens by seat position.

Seat Position	Base	Percent Restrained
Front Seat - Center	628	5.6
Front Seat - Outboard	4,116	34.9
Total Front Seat	4,744	31.0
Back Seat - Driver	2,323	23.2
Back Seat - Center	1,693	7.0
Back Seat - Outboard	2,599	22.4
Total Back Seat	6,615	18.7
Rear (i.e., station wagons & hatchbacks)	381	4.5
Total	11,740	23.3

Teens (Ages 13 to 19 Years)

With the exclusion of children 4 years of age and younger, this age group was observed to have the lowest safety belt usage. Of a total of 11,428 teens, only 12.7 percent were observed using safety belts. However, in 1984 only 7.2 percent of 13,575 teens were observed using safety belts. Table 45 shows teen safety belt usage by city for each of the 19 cities. The percentage of use ranged from a high of 20.0 percent for San Diego to a low of 5.9 percent for New Orleans.

Safety belt use by seating position (Table 46) indicates that teens in front seat positions were nearly three 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 1984 study.

Table 45. Passenger safety belt usage for teens by city.

City	Base	Percent Restrained
San Diego	909	20.0
San Francisco	632	19.5
Seattle	582	17.7
Chicago	548	17.0
Los Angeles	252	16.7
New York	518	16.4
Minneapolis/St. Paul	1,047	14.6
Birmingham	295	14.6
Atlanta	610	13.1
Phoenix	766	12.9
Pittsburgh	1,246	10.9
Dallas	474	9.7
Miami	394	9.1
Houston	360	8.9
Baltimore	337	8.9
Fargo/Moorhead	911	7.6
Boston	551	7.1
Providence	537	6.3
New Orleans	459	5.9
Total	11,428	12.7

Table 46. Passenger safety belt usage for teens by seat position.

Seat Position	Base	Percent Restrained
Front Seat - Center	520	0.6
Front Seat - Outboard	7,012	17.3
Total Front Seat	7,532	16.1
Back Seat - Driver	1,296	7.9
Back Seat - Center	609	1.0
Back Seat - Outboard	1,943	6.6
Total Back Seat	3,848	6.1
Rear (i.e., station wagon & hatchbacks)	48	0.0
Total	11,428	12.7

Adults (20 Years and Older)

Adult passengers were observed wearing safety belts in 20.8 percent of 50,544 observations. This compares with 13.0 percent for the 1984 study. Table 47 shows the number of observations and percent safety belt usage for each of the 19 cities. The highest safety belt usage was observed in New York (42.5 percent) and the lowest was observed in New Orleans (10.1 percent). It should be understood, however, that the high usage rate in New York is directly related to the mandatory safety belt law which covers front seat passengers.

Table 47. Passenger safety belt usage for adults by city.

City	Base	Percent Restrained
New York	2,097	42.5
San Francisco	2,737	29.6
Seattle	4,194	26.8
San Diego	2,666	26.3
Chicago	3,041	26.0
Phoenix	3,039	23.4
Baltimore	2,054	22.2
Minneapolis/St. Paul	2,643	21.5
Los Angeles	2,183	20.3
Dallas	2,324	19.6
Providence	2,194	18.2
Atlanta	3,199	17.8
Pittsburgh	3,371	17.3
Boston	2,364	17.2
Birmingham	2,077	14.9
Miami	2,855	14.2
Houston	2,513	13.5
Fargo/Moorhead	1,762	12.8
New Orleans	3,231	10.1
Total	50,544	20.8

Adults observed in the front seat were observed to use safety belts in 23.1 percent of the observations while only 3.8 percent safety belt usage was observed for back seat adult passengers (Table 48). This relationship was also shown in the 1984 study.

Table 48. Passenger safety belt usage for adults by seat position.

Seat Position	Base	Percent Restrained
Front Seat - Center	636	1.4
Front Seat - Outboard	43,834	23.4
Total Front Seat	44,470	23.1
Back Seat - Driver	1,949	4.7
Back Seat - Center	480	0.8
Back Seat - Outboard	3,618	3.7
Total Back Seat	6,047	3.8
Rear (i.e., station wagons and hatchbacks)	27	7.4
Total	50,544	20.8

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 if the child is harnessed in the safety seat and whether a shield is 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 this study, 3,460 safety seats were observed in parked vehicles at the same shopping malls used in the passenger study. The type of safety seat and the observed mode of use are shown in Table 49. Of the 245 seats observed in an infant mode (rearward facing), 124 (50.6 percent) were of the "infant-only" (non-convertible) variety. That is, the seats cannot be converted between infant and toddler modes. For these 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 CENTURY seat. STROLEE was the most frequently observed seat in the toddler mode, while KOLCRAFT seats were the most frequently observed booster seats. Overall, STROLEE safety seats were observed most often (30.1 percent).

Table 49. Types of child safety seats installed (percentage of safety seat observations by mode is shown parenthetically).

Name/ Manufacturer	Observed Mode Infant	Toddler	Booster	All Safety Seats
Infant Love Seat	61(24.9)	N/A	N/A	61(1.8)
Dyn-O-Mite	52(21.2)	N/A	N/A	52(1.5)
Other Infant Seat	11(4.5)	N/A	N/A	11(0.3)
Bobby-Mac	7(2.9)	99(3.2)	12(9.8)	118(3.4)
Century	32(13.1)	788(25.5)	24(19.7)	844(24.4)
Collier-Keyworth	5(2.0)	121(3.9)	20(16.4)	146(4.2)
Cosco	13(5.3)	224(7.2)	12(9.8)	249(7.2)
Questor (Kantwet)	28(11.4)	684(22.1)	1(0.8)	713(20.6)
Strolee	25(10.2)	1,006(32.5)	11(9.0)	1,042(30.1)
Kolcraft	4(1.6)	70(2.3)	36(29.5)	110(3.2)
Teddytot (Astroseat)	7(2.9)	101(3.3)	6(4.9)	114(3.3)
Total	245(100.0)	3,093(100.0)	122(100.0)	3,460(100.0)

Table 50 shows the types of toddler safety seats by model observed during the special study. As previously discussed, STROLEE seats (including the 500 and 600 Series) were observed more frequently in the toddler mode than any other manufacturer. However, in looking at individual models the Kantwet One Step, manufactured by QUESTOR, was the most frequently observed seat (21.0 percent).

Table 50. Types of toddler safety seats installed by model.

Manufacturer/Model	Base	Percent of Total
Bobby-Mac	99	3.2
Deluxe II	48	1.6
Champion	45	1.5
Other	6	0.2
Century	788	25.5
100	194	6.3
200	273	8.8
300	258	8.3
400 XL	8	0.3
Child Love	55	1.8
Collier-Keyworth	121	3.9
Safe & Sound	118	3.8
Roundtripper	3	0.1
Cosco	224	7.2
Safe-T-Seat	60	1.9
Safe-T-Shield	62	2.0
Safe & Snug	74	2.4
Safe & Easy	18	0.6
Other	10	0.3
Questor	684	22.1
Kantwet One Step	648	21.0
Kantwet Care Seat	15	0.5
Kantwet Safe Guard	9	0.3
Other	12	0.4
Strolee	1,006	32.5
500 Series	595	19.2
600 Series	411	13.3
Kolcraft	70	2.3
Hi-Rider	46	1.5
Redi-Rider	14	0.5
Quick Step	10	0.3
Teddy Tot	101	3.3
Astroseat	101	3.3
Total	3,093	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 3,093 toddler seats, 2,443 (79.0 percent) of the belt only and 650 (21.0 percent) of the belt and tether systems were observed, as shown in Table 51. This table also shows that safety seats that secure by the safety belt only were observed to be correctly installed 70.2 percent of the time, whereas, those that require a tether were much less likely to be installed correctly (i.e., 6.9 percent). Overall, 56.9 percent of the toddler seats observed were properly secured.

Table 51. Correct installation of toddler safety seats by method of fastening the seat.

Method of Fastening Seat	Base	Percent Correct Installation
Secured by Car Safety Belt Only	2,443	70.2
Secured by Tether and Car Safety Belt	650	6.9
Total	3,093	56.9

Figure 4 shows the percentage of belt-only and belt and tether type toddler seats observed since 1983. This figure illustrates the steady increase in the percentage of belt-only seats observed and, likewise, the reciprocal decline of belt and tether seats. What was once only an 11.2 percent difference between the two types of seats has increased to 58.0 percent in 1985. Figure 5 shows that the 70.2 percent rate of correctly installed belt-only seats is a significant increase over the previous two years. By studying both figures, it can be seen that the increasing correct installation of toddler safety seats as a whole, over the past two years, is a function of the increasing percentage of belt-only seats in the population combined with the increasing correct installation of these seats. Part of this increase in correct installation is believed to be attributed to the clearly marked, correct routing stickers on many of the newer seats.

The installation characteristics of the 2,443 toddler seats observed in 1985 that require securing with safety belts only are shown in Figure 6. In 70.2 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 5.9 percent of the observations and improperly used 23.9 percent of the time. Table 52 shows installation characteristics by manufacturer for toddler seats that require securing by only the vehicle safety belt.

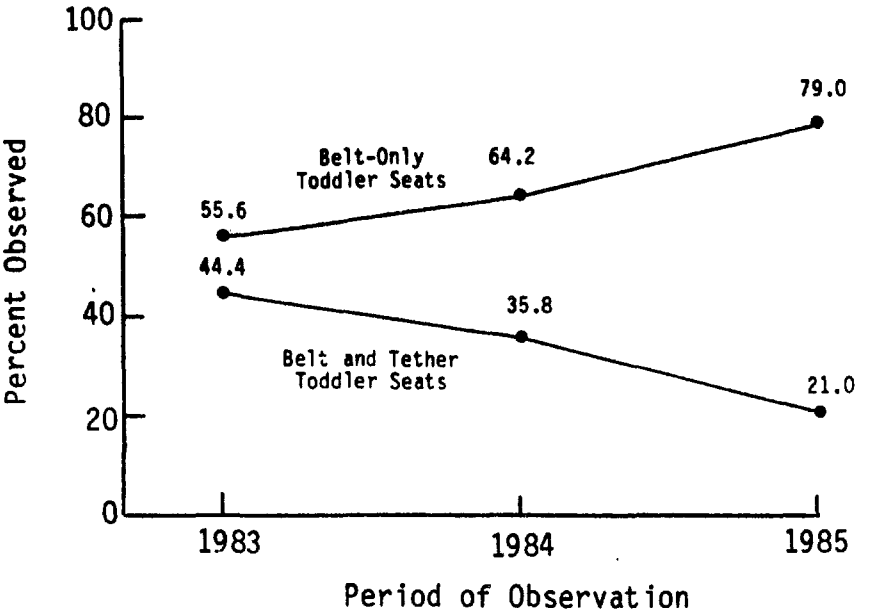


Figure 4. Percent of toddler safety seats observed over time by type of system.

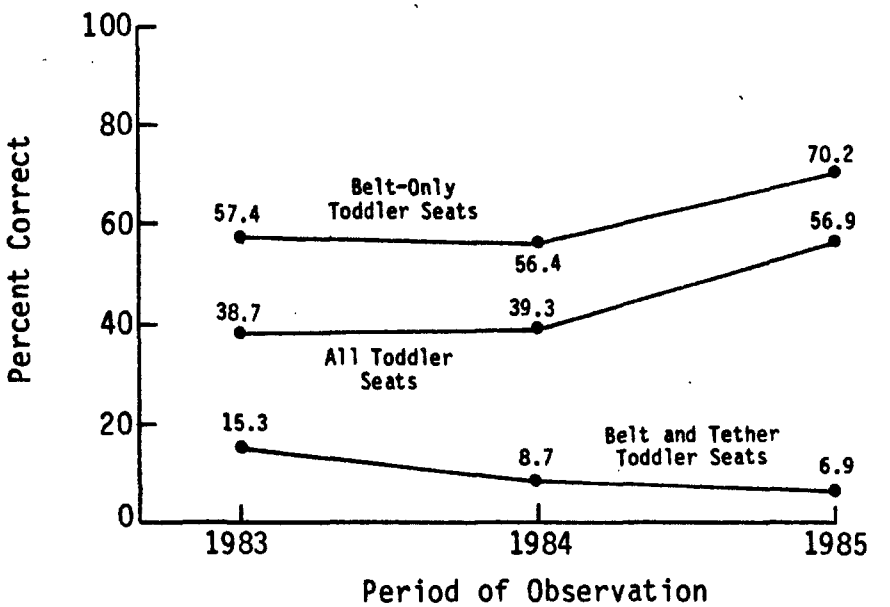


Figure 5. Correct installation of toddler safety seats over time by type of system.

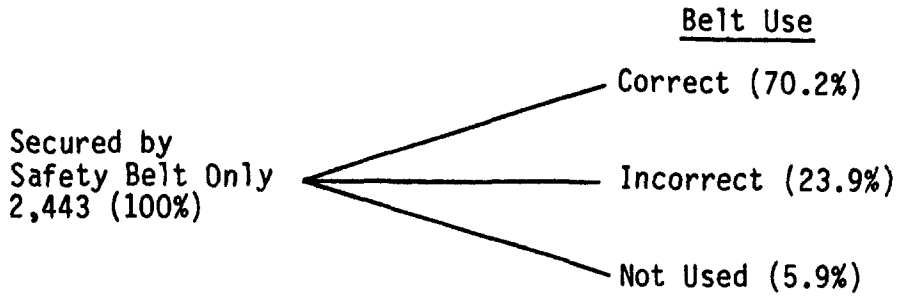


Figure 6. Installation characteristics of toddler seats that require securing by the safety belt only.

Table 52. Toddler seat installation characteristics by manufacturer (for toddler seats that require securing by only the vehicle safety belt).

Manufacturer	Base	Percent Appears Correct	Percent Car Belt Not Used	Percent Car Belt Used Incorrectly
Bobby-Mac	99	100.0*	0.0	0.0
Century	733	67.3*	3.3	29.5
Collier-Keyworth	121	85.1	9.1	5.8
Cosco	224	65.2	10.7	24.1
Questor (Kantwet)	684	65.8	7.3	26.9
Strolee	411	76.4	3.9	19.7
Kolcraft	70	67.1	14.3	18.6
Teddytot (Astroseat)	101	65.3	8.9	25.7
Total	2,443	70.2	5.9	23.9

* Some safety seats (Century Child Love Seat, Bobby-Mac Champion, and Bobby-Mac Deluxe II) require safety belt attachment around the child as opposed to direct attachment to the safety seat. These seats were coded as "Appears Correct".

For toddler seats that require securing by the safety belt and tether, there exists the possibility that more than one misuse may be present. Figure 7 illustrates the correct/incorrect installation characteristics for the 650 toddler seats observed that require securing by the safety belt and tether. This figure shows that only 6.9 percent of the seats observed were properly tethered and belted. Failure to tether the seat was the most prominent type of misuse observed (88.8 percent). However, a tether was used incorrectly in only 1.4 percent of the observations. The most frequently observed multiple misuse was not using the

tether and incorrectly belting the seat to the vehicle (31.1 percent). This table also shows that only 5.9 percent of the toddler seats were not belted (by summing the "Not Used" percentages in the belt use column) and in 34.0 percent of the observations, the safety belt was incorrectly attached to the toddler seat (by summing the "Incorrect" percentages in the belt use column). Table 53 shows installation characteristics by manufacturer for toddler seats that require securing by the safety belt and tether strap.

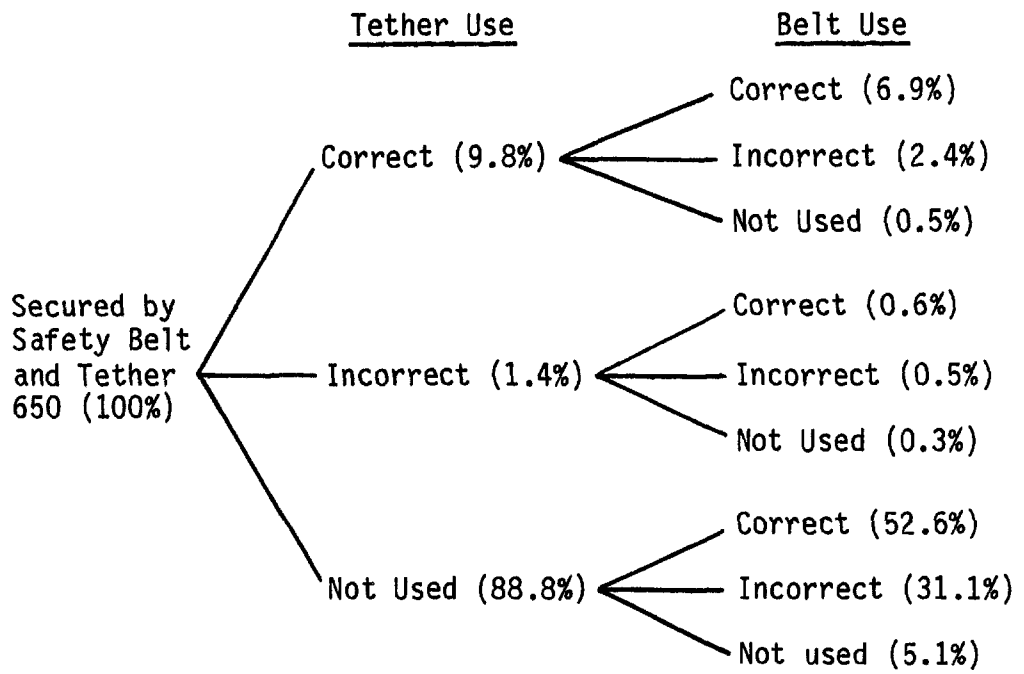


Figure 7. Installation characteristics of toddler seats that require securing by the safety belt and tether.

Table 53. Toddler seat installation characteristics by manufacturer (for toddler seats that require the vehicle safety belt and tether strap).

Manufacturer	Base	Percent Appears Correct	Percent Tether Not Used	Percent Tether Used Incorrectly	Percent Belt Not Used	Percent Car Belt Used Incorrectly
Century	55	12.7	81.8	3.6	1.8	0.0
Strolee	595	6.4	89.4	1.2	6.2	37.1
Total	650	6.9	88.8	1.4	5.9	34.0

Helmet Study Findings

During the period January to December, 1985, 10,869 observations were made of helmet use by operators and passengers of motorcycles and mopeds. Table 54 shows helmet usage rates in each city for drivers and passengers of motorcycles. Of 9,127 motorcycle drivers, 65.5 percent were observed wearing helmets compared to 48.6 percent of the 1,132 passengers.

Table 54. Helmet use for motorcycle operators and passengers.

City	Driver Base	Percent Helmet On	Passenger Base	Percent Helmet On
Boston	245	99.2	35	100.0
Providence	133	48.1	14	100.0
New York	50	94.0	7	85.7
Baltimore	109	48.6	15	60.0
Pittsburgh	118	99.2	16	100.0
Chicago	599	43.6	86	27.9
Minneapolis/St.Paul	607	50.4	88	29.5
Fargo/Moorhead	725	43.2	92	28.3
Miami	562	99.8	69	100.0
Atlanta	435	100.0	28	100.0
Birmingham	536	100.0	53	100.0
New Orleans	586	99.7	64	100.0
Seattle	738	65.3	124	44.4
San Francisco	383	59.3	34	41.2
San Diego	1,031	61.0	105	33.3
Los Angeles	620	55.2	80	18.8
Phoenix	791	49.8	99	27.3
Houston	617	47.6	93	31.2
Dallas	242	38.4	30	16.7
Total	9,127	65.5	1,132	48.6

Driver and passenger helmet usage rates by year (1983 through 1985) are shown in Figure 8. This figure shows that passenger helmet usage is declining over time while driver rates are remaining fairly constant.

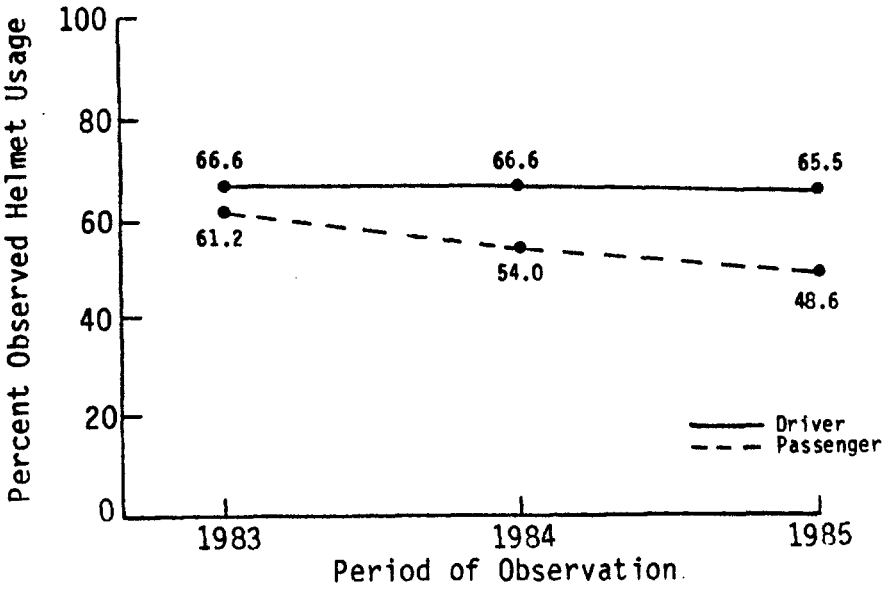


Figure 8. Motorcycle helmet use trends for operators and passengers.

Table 55 shows helmet usage rates in each city for drivers and passengers of mopeds (motorized bicycles). Comparing the results of this table (47.9 percent for drivers and 24.0 percent for passengers) to Table 54 reveals that, overall, drivers and passengers of mopeds were less likely to be wearing helmets than their counterparts on motorcycles.

Table 55. Helmet use for moped operators and passengers.

City	Driver Base	Percent Helmet On	Passenger Base	Percent Helmet On
Boston	31	3.2	10	0.0
Providence	3	0.0	0	--
New York	0	--	0	--
Baltimore	0	--	0	--
Pittsburgh	1	100.0	0	--
Chicago	29	20.7	2	0.0
Minneapolis/St.Paul	21	0.0	2	0.0
Fargo/Moorhead	5	40.0	0	--
Miami	51	70.6	5	80.0
Atlanta	11	100.0	0	--
Birmingham	21	100.0	1	100.0
New Orleans	73	97.3	10	70.0
Seattle	63	54.0	9	0.0
San Francisco	44	40.9	5	40.0
San Diego	65	33.8	14	21.4
Los Angeles	82	30.5	12	8.3
Phoenix	18	22.2	4	0.0
Houston	13	15.4	0	--
Dallas	4	50.0	1	0.0
Total	535	47.9	75	24.0

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 56 shows the seven cities in which mandatory helmet laws exist. Helmet use for both drivers and passengers were recorded to be 99.6 percent. Table 57 lists the twelve cities with no or limited laws. Driver and passenger helmet use rates for these cities were observed to be 52.4 and 32.4 percent, respectively.

Table 56. Motorcycle helmet use in cities with mandatory helmet use laws.

City	Driver Base	Percent Helmet On	Passenger Base	Percent Helmet On
Boston	245	99.2	35	100.0
New York	50	94.0	7	85.7
Pittsburgh	118	99.2	16	100.0
Miami	562	99.8	69	100.0
Atlanta	435	100.0	28	100.0
Birmingham	536	100.0	53	100.0
New Orleans	586	99.7	64	100.0
Total	2,532	99.6	272	99.6

Table 57. Motorcycle helmet use in cities with no or limited helmet use laws.

City	Driver Base	Helmet On	Passenger Base	Helmet On
Providence	133	48.1	14	100.0
Baltimore	109	48.6	15	60.0
Chicago	599	43.6	86	27.9
Minneapolis/St.Paul	607	50.4	88	29.5
Fargo/Moorhead	725	43.2	92	28.3
Seattle	738	65.3	124	44.4
San Francisco	383	59.3	34	41.2
San Diego	1,031	61.0	105	33.3
Los Angeles	620	55.2	80	18.8
Phoenix	791	49.8	99	27.3
Houston	617	47.6	93	31.2
Dallas	242	38.4	30	16.7
Total	6,595	52.4	860	32.4

Figure 9 illustrates the trend of driver and passenger helmet use on motorcycles, in cities with mandatory helmet laws and cities with no or limited helmet use laws. This figure shows a decline in helmet use among passengers in cities with no or limited helmet use laws.

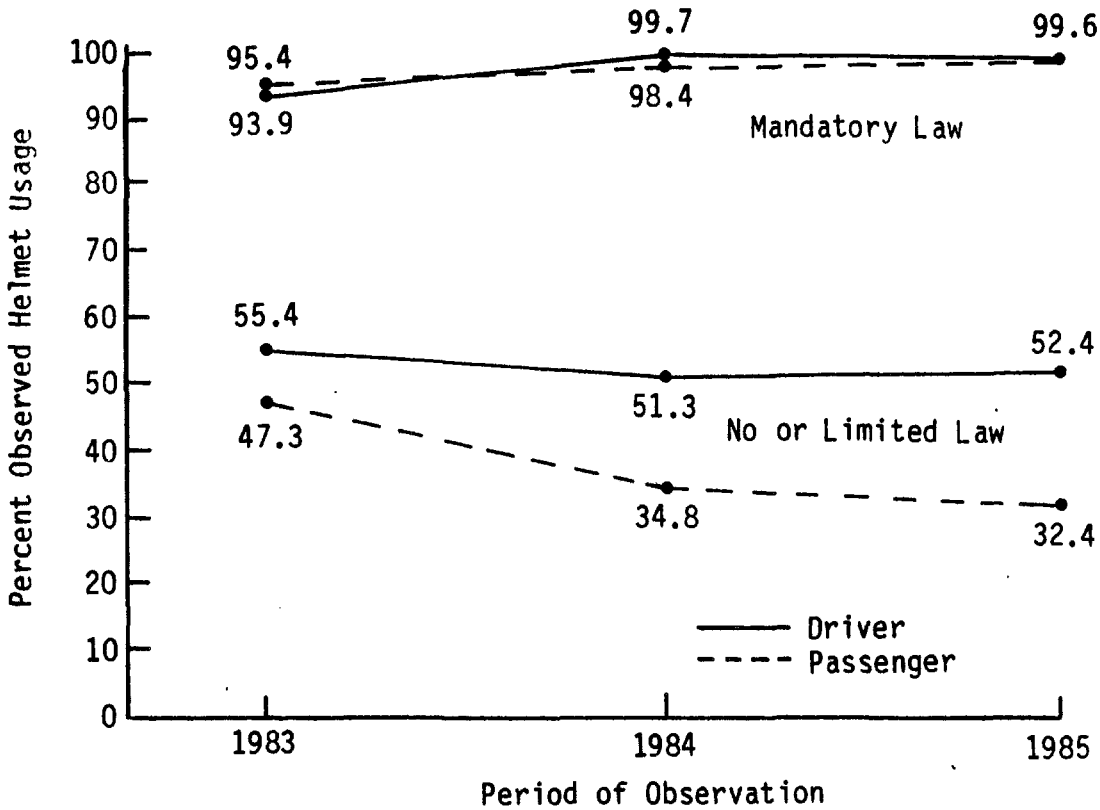


Figure 9. Motorcycle helmet use trends for operators and passengers by the existence of mandatory helmet use laws.

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1. Phillips, B.M., "Restraint System Usage in the Traffic Population" DOT-HS-806-424, National Highway Traffic Safety Administration, May, 1983.

2. Perkins, D.D., Cynecki, M.J., and Goryl, M.E., "Restraint System Usage in the Traffic Population", DTNH22-82-C-07126, National Highway Traffic Safety Administration, July, 1984.

3. Goryl, M.E. and Cynecki, M.J., "Restraint System Usage in the Traffic Population: 1984 Annual Report," DTNH22-82-C-07126, National Highway Traffic Safety Administration, March, 1985.

4. Vindicator 85 User's Guide, Release No. 1, Highway Loss Data Institute, January, 1985.

APPENDIX A - DRIVER SAFETY BELT USAGE BY MANUFACTURER'S DIVISION AND MODEL YEAR (1976-1986)

TABLE OF CONTENTS

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

Model Year	Base	Percent Belted
1976	29	17.2
1977	21	14.3
1978	20	10.0
1979	23	8.7
1980	17	11.8
1981	21	9.5
1982	15	13.3
1983	4	25.0
1984	2	50.0
1985/86	0	--
Total	152	13.2

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

Model Year	Base	Percent Belted
1976	63	17.5
1977	76	21.1
1978	60	15.0
1979	46	10.9
1980	37	29.7
1981	58	34.5
1982	30	33.3
1983	49	32.7
1984	64	21.9
1985/86	29	17.2
Total	512	22.9

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

Model Year	Base	Percent Belted
1976	67	26.9
1977	56	12.5
1978	60	21.7
1979	65	18.5
1980	31	16.1
1981	33	18.2
1982	43	39.5
1983	45	28.9
1984	75	37.3
1985/86	42	23.8
Total	517	25.0

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

Model Year	Base	Percent Belted
1976	26	7.7
1977	45	13.3
1978	45	17.8
1979	51	25.5
1980	20	20.0
1981	9	33.3
1982	31	22.6
1983	71	25.4
1984	99	25.3
1985/86	25	16.0
Total	422	21.3

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

Model Year	Base	Percent Belted
1976	128	10.2
1977	199	14.6
1978	216	13.9
1979	219	13.2
1980	235	20.9
1981	226	23.0
1982	197	21.3
1983	242	27.7
1984	312	25.6
1985/86	157	30.6
Total	2,131	20.6

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

Model Year	Base	Percent Belted
1976	306	12.4
1977	477	12.8
1978	458	17.3
1979	502	16.7
1980	450	16.2
1981	335	25.7
1982	312	25.0
1983	330	20.0
1984	474	25.5
1985/86	150	16.0
Total	3,794	18.7

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

Model Year	Base	Percent Belted
1976	71	8.5
1977	131	16.8
1978	168	15.5
1979	165	15.8
1980	110	17.3
1981	108	23.2
1982	104	25.0
1983	115	21.7
1984	147	20.4
1985/86	44	11.4
Total	1,163	18.1

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

Model Year	Base	Percent Belted
1976	135	14.1
1977	236	16.5
1978	256	14.1
1979	277	17.3
1980	244	18.9
1981	239	25.1
1982	217	20.7
1983	269	28.3
1984	392	30.9
1985/86	77	23.4
Total	2,342	21.7

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

Model Year	Base	Percent Belted
1976	82	11.0
1977	139	15.8
1978	167	9.6
1979	185	18.9
1980	143	21.0
1981	100	21.0
1982	118	28.0
1983	100	27.0
1984	206	27.2
1985/86	45	22.2
Total	1,285	20.2

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

Model Year	Base	Percent Belted
1976	293	11.3
1977	265	13.2
1978	344	10.5
1979	416	16.4
1980	259	15.8
1981	225	22.7
1982	225	19.1
1983	241	19.9
1984	427	25.5
1985/86	122	14.8
Total	2,817	17.1

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

Model Year	Base	Percent Belted
1976	47	10.6
1977	70	11.4
1978	85	8.2
1979	94	9.6
1980	45	15.6
1981	56	19.6
1982	52	15.4
1983	67	29.9
1984	109	23.9
1985/86	32	21.9
Total	657	16.4

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

Model Year	Base	Percent Belted
1976	15	13.3
1977	38	5.3
1978	27	14.8
1979	41	7.3
1980	17	5.9
1981	22	18.2
1982	28	7.1
1983	41	14.6
1984	51	9.8
1985/86	7	0.0
Total	287	10.1

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

Model Year	Base	Percent Belted
1976	30	26.7
1977	52	26.9
1978	71	35.2
1979	74	46.0
1980	71	42.3
1981	47	46.8
1982	69	34.8
1983	39	46.2
1984	67	31.3
1985/86	4	0.0
Total	524	37.4

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

Model Year	Base	Percent Belted
1976	76	19.7
1977	128	25.8
1978	163	27.6
1979	170	23.5
1980	225	32.0
1981	202	38.1
1982	206	37.4
1983	233	39.1
1984	164	34.2
1985/86	105	49.5
Total	1,672	33.4

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

Model Year	Base	Percent Belted
1976	56	23.2
1977	59	20.3
1978	102	28.4
1979	114	16.7
1980	158	17.7
1981	133	28.6
1982	151	31.1
1983	180	36.1
1984	152	33.6
1985/86	3	66.7
Total	1,108	27.4

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

Model Year	Base	Percent Belted
1976	24	16.7
1977	50	22.0
1978	62	32.3
1979	57	29.8
1980	95	32.6
1981	95	33.7
1982	121	35.5
1983	147	44.2
1984	186	37.1
1985/86	73	49.3
Total	910	36.0

Table A.17. Driver safety belt usage for other imports by model year.

Model Year	Base	Percent Belted
1976	60	35.0
1977	47	17.0
1978	82	21.9
1979	105	29.5
1980	118	33.9
1981	176	30.1
1982	205	34.6
1983	246	38.6
1984	353	32.3
1985/86	100	35.0
Total	1,492	32.6

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 1976-1986 model years by car series for each manufacturer. Only those models that have 20 or more observations are presented.

Manufacturer/Series	Base	Percent Belted
American Motors		
Concord	63	9.5
Pacer	20	15.0
Spirit	25	12.0
Plymouth		
Fury	33	15.2
Horizon	106	21.7
Reliant	153	31.4
Volare	190	18.4
Dodge		
Aries	116	30.2
Aspen	135	24.4
Diplomat	41	9.8
Omni	101	35.6
Chrysler		
Cordoba	72	9.7
LeBaron	150	30.0
New Yorker	141	16.3

Manufacturer/Series	Base	Percent Belted
Buick		
Century	304	27.3
Electra	271	18.8
Le Sabre	339	15.9
Regal	718	18.2
Riviera	107	15.9
Skyhawk	85	24.7
Skylark	275	27.3
Chevrolet		
Camaro	380	16.3
Caprice	518	19.7
Cavalier	259	26.3
Celebrity	213	25.4
Chevelle	109	11.0
Chevette (Regular)	447	19.0
Citation	233	24.5
Corvette	50	14.0
Impala	311	15.8
Malibu	389	24.7
Monte Carlo	569	11.8
Monza	66	16.7
Nova	210	18.6
Vega	20	5.0

Manufacturer/Series	Base	Percent Belted
Cadillac		
Brougham	154	20.1
Deville	594	18.2
Eldorado	222	15.8
Seville	174	17.2
Oldsmobile		
Custom Cruiser	59	30.5
Cutlass	1,162	18.6
Delta 88	455	23.7
Firenza	42	16.7
Ninety-Eight	259	18.1
Omega	114	27.2
Toronado	63	17.5
Ciera	166	39.8
Pontiac		
Bonneville	202	17.8
Catalina	47	10.6
Fiero	28	28.6
Firebird	203	19.2
GrandPrix	331	13.3
Grand Le Mans	26	42.3
J 2000/2000	82	31.7
Le Mans	52	25.0
Phoenix	72	20.8
Sunbird	85	16.5
T 1000/1000	36	30.6
6000	72	34.7

Manufacturer/Series	Base	Percent Belted
Ford		
Elite	26	3.9
Escort	320	24.1
EXP	32	28.1
Fairmont	358	17.0
Fiesta	46	26.1
Ford Wagon	52	19.2
Granada	358	13.4
LTD	449	16.7
LTD II	67	10.4
Maverick	30	20.0
Mustang	406	17.0
Pinto	140	14.3
Tempo	153	22.9
Thunderbird	354	14.4
Mercury		
Capri	50	10.0
Cougar	208	10.1
Lynx	45	22.2
Marquis	193	23.3
Monarch	54	9.3
Zephyr	62	25.8

Manufacturer/Series	Base	Percent Belted
Lincoln		
Continental	193	11.4
Mark Series	86	7.0
Foreign Models		
Audi	143	34.3
BMW	120	34.2
Datsun/Nissan	1,108	27.4
Fiat	64	21.9
Honda	910	36.0
Mazda	320	26.6
Mercedes Benz	100	26.0
Mitsubishi	32	28.1
Porsche	30	23.3
Renault	94	27.7
Saab	24	33.3
Subaru	195	40.0
Toyota	1,672	33.4
Volkswagen Rabbit	374	41.7
Volkswagen Other	150	26.7
Volvo	292	42.8

APPENDIX C - 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 C.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 with 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 Conditons: 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 belt 1 Both 2 Lap 3 None	Automatic Restraint System 1 Yes 2 No	Driver and Passenger Position by Age Group Driver	Center	Outboard	Rear of Sta. Wagon Hatchback Number of Children
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 C.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.

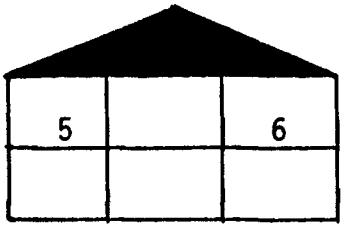
6. **Automatic Restraint System:** The automatic safety belt system will be found mainly in newer Volkswagon Rabbits and Jettas, Chevrolet Chevettes, and Toyota Cressidas. When observing these three makes, you will have to determine whether the belt system is an "automatic" system (Code 1) or a regular 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.

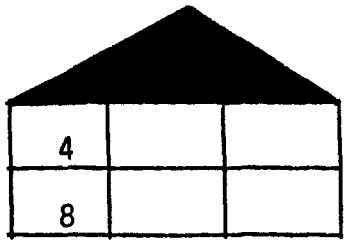
7. **Driver and Passenger Position by Age Group:** Record the age group code shown at bottom of the form in one of the six seat position boxes on the observation form. The six boxes are intended to illustrate the six seat positions of the passenger car with the driver side on the left, and the outboard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



(Front)

(Back)

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 C.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 Conditons: Dry Wet Snow/Ice

10. Start Time:_____ AM PM 11. End Time:_____ AM PM

No.	Total Passengers	Age Group*	Seat 1 Front 2 Back 3 Rear	Position 1 Driver Side 2 Center 3 Outboard	Passenger Restraint 1 L/S Belt 2 Lap Belt 3 Infant Seat 4 Toddler Seat 5 Booster Seat 6 Unsafe Seat 7 None * On Lap	Infant Seat 1 Harness/Car Belt 2 Harness Only 3 Car Belt Only 4 No Harness/Car Belt 5 Facing Wrong Direction 6 Unsure 7 Unused Seat	Toddler Seat 1 Harness/Shield 2 - 3 - 4 No Harness/ Shield 5 Other/Unsafe 6 Unsure 7 Unused Seat	Booster Seat 1 Harness/Lap Belt 2 Shoulder/Lap Belt 3 Lap Belt Only 4 No Harness/Car Belt 5 Other/Unsafe 6 Unsure 7 Unused Seat
1.								
2.								
3.								
4.								
5.								
6.								
7.								
8.								
9.								
10.								
11.								
12.								
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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 C.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 all 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.

7. **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 restraind 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 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 an 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 C.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 outboard 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 Conditons: 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 1 Tether required properly used 2 Tether required improperly used 3 Tether required not used 4 Tether not required	Belting Attached to Seat 1 Proper 2 Improper 3 No 4 Not required	Shield Required 1 Yes 2 No	Infant or Toddler Seat Model/Comments
1.						
2.						
3.						
4.						
5.						
6.						
7.						
8.						
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Figure C.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 identifed as one that requires the vehicles belt system to be attached to the undercarraige 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 misusage 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 C.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.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
12.			
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22.			
23.			
24.			
25.			

Figure C.4. Helmet study data form.

APPENDIX D - SUMMARY OF BI-ANNUAL OBSERVATIONS

PERCENT OF INFANTS OBSERVED IN CHILD SAFETY SEATS

January - June, 1985

	Base	Percent
Total (19 Cities)	579	65.5
*Boston	15	86.7
*Providence	18	77.8
New York	14	50.0
*Baltimore	35	77.1
Pittsburgh	14	64.3
Chicago	57	73.7
*Minneapolis/St. Paul	20	70.0
*Fargo/Moorhead	19	78.9
Miami	38	47.4
Atlanta	22	68.2
Birmingham	41	75.6
*New Orleans	58	72.4
*Seattle	31	74.2
*San Francisco	41	43.9
San Diego	31	71.0
*Los Angeles	50	44.0
Phoenix	9	66.7
Houston	41	58.5
Dallas	25	68.0
Avg. Percent Per City		66.8

*Reported in June, 1985

PERCENT OF TODDLERS OBSERVED IN CHILD SAFETY SEATS

January - June, 1985

	Base	Percent
Total (19 Cities)	6,057	50.4
*Boston	258	46.1
*Providence	350	69.7
New York	283	59.4
*Baltimore	262	85.1
Pittsburgh	335	44.8
Chicago	335	71.6
*Minneapolis/St. Paul	419	40.1
*Fargo/Moorhead	254	29.1
Miami	266	65.4
Atlanta	232	69.8
Birmingham	265	54.0
*New Orleans	323	70.6
*Seattle	288	57.3
*San Francisco	571	24.9
San Diego	370	57.8
*Los Angeles	420	26.9
Phoenix	241	29.0
Houston	341	53.1
Dallas	244	29.5
Avg. Percent Per City		51.8

*Reported in June, 1985

PERCENT OBSERVED SAFETY BELT USE BY PASSENGERS

January - June, 1985

	Toddler		Sub-Teen		Teen		Adult	
	Base	Percent	Base	Percent	Base	Percent	Base	Percent
Total (19 Cities)	6,057	9.3	5,681	21.3	5,697	13.1	24,033	20.4
*Boston	258	14.0	353	26.3	271	5.9	1,276	13.4
*Providence	350	5.7	244	30.7	285	6.0	907	19.0
New York	283	3.5	207	27.1	212	23.1	1,021	50.0
*Baltimore	262	4.6	249	42.2	160	8.1	834	21.5
Pittsburgh	335	21.2	261	22.2	552	14.9	1,275	19.2
Chicago	335	3.6	303	18.2	189	9.5	1,284	14.6
*Minneapolis/St. Paul	419	16.5	395	25.3	761	17.0	1,289	27.1
*Fargo/Moorhead	254	12.2	286	14.7	464	8.8	938	12.0
Miami	266	7.5	254	18.1	164	11.6	1,728	13.0
Atlanta	232	5.2	328	16.2	278	10.8	1,542	17.1
Birmingham	265	5.3	320	13.7	168	11.3	1,144	11.4
*New Orleans	323	8.4	564	17.7	314	6.4	1,456	10.2
*Seattle	288	13.2	354	38.4	323	18.6	1,788	29.2
*San Francisco	571	8.2	253	16.6	145	15.9	1,261	30.5
San Diego	370	15.4	270	28.1	716	20.8	1,285	29.6
*Los Angeles	420	7.4	299	15.4	131	18.3	1,124	23.7
Phoenix	241	6.6	238	13.9	201	5.5	1,404	21.6
Houston	341	8.5	299	10.0	188	5.9	1,256	12.9
Dallas	244	5.7	204	10.8	175	9.1	1,221	16.4
Avg. Percent Per City		9.1		21.3		12.0		20.7

*Reported in June, 1985

PERCENT OF INFANTS OBSERVED IN CHILD SAFETY SEATS

	July - December, 1985	
	Base	Percent
Total (19 Cities)	594	65.9
Boston	22	63.6
Providence	29	58.6
New York	18	44.4
*Baltimore	37	75.7
Pittsburgh	26	76.9
Chicago	82	65.9
Minneapolis/St. Paul	21	47.6
Fargo/Moorhead	10	80.0
*Miami	33	63.6
Atlanta	46	67.4
Birmingham	50	70.0
*New Orleans	66	54.5
*Seattle	19	89.5
San Francisco	32	71.9
San Diego	19	78.9
Los Angeles	24	70.8
*Phoenix	24	70.8
Houston	14	50.0
Dallas	22	59.1
Avg. Percent Per City		66.3

*Reported in December, 1985

PERCENT OF TODDLERS OBSERVED IN CHILD SAFETY SEATS

July - December, 1985

	Base	Percent
Total (19 Cities)	5,558	55.1
Boston	270	70.0
Providence	270	69.3
New York	339	59.0
*Baltimore	277	85.9
Pittsburgh	406	46.6
Chicago	342	65.2
Minneapolis/St. Paul	407	34.8
Fargo/Moorhead	261	28.0
*Miami	247	72.5
Atlanta	288	59.0
Birmingham	192	59.9
*New Orleans	379	55.1
*Seattle	258	79.8
San Francisco	331	60.1
San Diego	249	67.9
Los Angeles	219	56.6
*Phoenix	224	46.0
Houston	316	22.2
Dallas	267	28.1
Avg. Percent Per City		56.1

*Reported in December, 1985

PERCENT OBSERVED SAFETY BELT USE BY PASSENGERS

July - December, 1985

	Toddler		Sub-Teen		Teen		Adult	
	Base	Percent	Base	Percent	Base	Percent	Base	Percent
Total (19 Cities)	5,558	9.3	6,059	25.1	5,731	12.3	26,511	21.2
Boston	270	7.4	196	26.5	280	8.2	1,088	21.7
Providence	270	5.2	144	18.1	252	6.7	1,287	17.7
New York	339	10.0	257	33.9	306	11.8	1,076	35.4
*Baltimore	277	4.7	112	50.9	177	9.6	1,220	22.7
Pittsburgh	406	15.0	565	26.2	694	7.8	2,096	16.1
Chicago	342	7.0	541	27.7	359	20.9	1,757	34.4
Minneapolis/St. Paul	423	9.9	276	16.7	286	8.4	1,354	16.2
Fargo/Moorhead	261	11.9	278	12.9	447	6.3	824	13.7
*Miami	247	4.0	123	23.6	230	7.4	1,127	16.0
Atlanta	288	11.8	501	23.2	332	15.1	1,657	18.6
Birmingham	192	7.3	226	27.9	127	18.9	933	19.3
*New Orleans	379	11.1	274	19.3	145	4.8	1,775	10.0
*Seattle	258	3.5	489	33.7	259	16.6	2,406	25.0
San Francisco	331	9.4	438	31.5	487	20.5	1,476	28.8
San Diego	249	8.0	458	26.2	193	17.1	1,381	23.2
Los Angeles	219	5.9	188	24.5	121	14.9	1,059	16.7
*Phoenix	224	14.7	300	29.3	565	15.6	1,635	25.0
Houston	316	11.7	274	11.7	172	12.2	1,257	14.2
Dallas	267	13.1	419	15.8	299	10.0	1,103	23.2
Avg. Percent Per City		9.0		25.2		12.3		20.9

*Reported in December, 1985