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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, 1986, are the basis for this report. The four studies and their findings are as follows: 1. Driver Safety Belt Use and Shoulder Belt Misuse: A total of 101,897 drivers stopped for traffic signals were observed during the 12 month period. 39.2 percent were observed to wear safety belts during the second data collection period (July to December). Approximately 3 percent of drivers wearing shoulder belts in 1986 were incorrectly using them. 2. Passenger Safety Belt and Child Safety Seat Use: Based on 106,930 passengers observed at shopping mall entrances and exits, child safety seat usage (for infants and toddlers) increased throughout 1986, reaching a high in the second half (July to December) of 75.8 percent. The percent of toddlers, subteens, teens, and adults wearing safety belts during the second half were observed to be 4.7, 29.6, 21.7, and 38.4 percent, respectively. 3. Safety Seat Installation Characteristics: Observations of 3,746 child safety seats in vehicles parked at shopping malls revealed that 75.4 percent of all toddler seat types were correctly installed. Toddler seats that require securing by only the safety belt had a correct usage rate of 83.3 percent. Only 4.6 percent of toddler seats that require both the safety belt and tether were used correctly. 4. Helmet Use by Operators and Passengers of Motorcycles and Mopeds: Driver and passenger helmet use were observed to be 59.8 and 47.7 percent, respectively, for 8,604 motorcycle observations. Helmet use for both drivers and passengers in cities with mandatory helmet use laws was observed to be 99.5 percent, while helmet use in cities with no or limited helmet use laws was observed to be 48.0 percent for drivers and 31.2 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 were used to: (1) determine the extent to which drivers and front-outboard passengers of automobiles used safety belts and incorrectly used (misused) shoulder belts; (2) determine the use of safety belts and child safety seats by passengers of automobiles; (3) determine correctness of safety seat installation; 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, 1986.

1. Driver Study Findings: Safety Belt Use

The following major findings, associated with driver safety belt usage, are based on a total of 101,897 observations of drivers stopped for traffic signals:

- Driver safety belt usage increased to 39.2 percent during the second half of calendar year 1986 (Figure 1).
- Female driver safety belt usage was consistently higher than male driver safety belt usage (42.8 percent versus 33.1 percent).
- Drivers of imported vehicles were observed to have a higher safety belt usage rate than drivers of domestic vehicles (47.2 percent versus 29.2 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.

2. Driver Study Findings: Shoulder Belt Misuse*

The following major findings are based on a total of 37,193 observations of drivers utilizing shoulder belts in 1986.

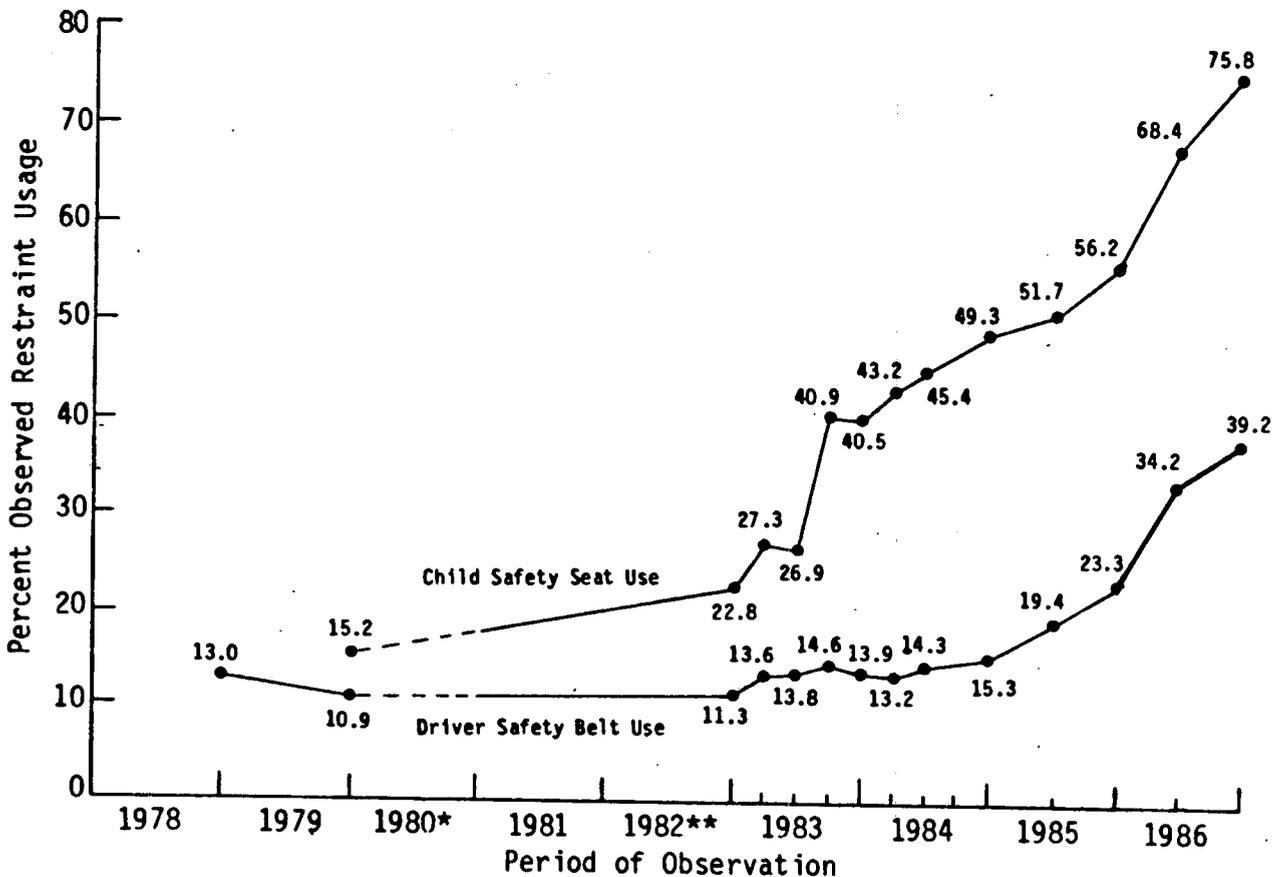
- Approximately 3 percent of drivers utilizing shoulder belts misused them.
- Female driver shoulder belt misuse was higher than male driver shoulder belt misuse (3.6 percent versus 2.5 percent). This was mainly due to more female drivers wearing the shoulder belt under the arm than male drivers (2.1 percent versus 1.2 percent).

* Under the arm, behind the back, or loose.

- More drivers of domestic vehicles wore their shoulder belts with excessive slack (i.e., too loose) than drivers of imported vehicles (1.1 percent versus 0.1 percent).
- Driver shoulder belt misuse was observed to be highest among the 50 or over age group.
- Shoulder belt misuse was lower for drivers of newer model vehicles.

3. Passenger Study Findings

A total of 106,930 passengers were observed at shopping mall entrances/exits during the study period. Figure 1 shows the upward trend for use of child safety seats during 1986, with usage increasing to 75.8 percent. By the end of 1986, 77.5 percent of infants and 75.7 percent of toddlers were observed travelling in a child safety seat. Figure 2 shows the upward trend in correct use of safety seats (infants and toddlers observed in safety seats). In 1986, correct infant safety seat usage was 67.8 percent while 91.2 percent of toddlers, observed in toddler seats, were harnessed and shielded (for those seats requiring shields). Passenger safety belt use during the second half (July to December) was observed to be 4.7 percent for toddlers, 29.6 percent for subteens, 21.7 percent for teens, and 38.4 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.

4. Safety Seat Installation Findings

A total of 3,746 safety seats were observed in vehicles parked at shopping malls. Seats installed in the infant mode were observed in 169 of the observations while 3,440 seats were observed in the toddler mode. The remaining 137 observations involved booster seats. For toddler seats that require installation using only the vehicle safety belt, 83.3 percent appeared to be installed properly and seat belts were used incorrectly in 15.0 percent of the observations. For toddler seats that require belting and tethering, only 4.6 percent were observed to be correctly installed. Tethers were not used or used incorrectly in 93.9 percent of the observations, while incorrect belting was observed for 41.4 percent of the seats. Figure 2 shows correct toddler seat installation increasing over time, with 75.4 percent of toddler seats installed correctly in 1986.

5. Helmet Study Findings

Of the 8,604 motorcycle observations, driver and passenger helmet use were observed to be 59.8 and 47.7 percent, respectively. In cities with mandatory helmet use laws, driver and passenger helmet use was observed to be 99.5 percent. Helmet use in cities with no or limited helmet use laws was observed to be 48.0 percent for drivers and 31.2 percent for passengers. Helmet use for drivers and passengers of 586 moped observations was observed to be 38.6 and 25.0 percent, respectively.

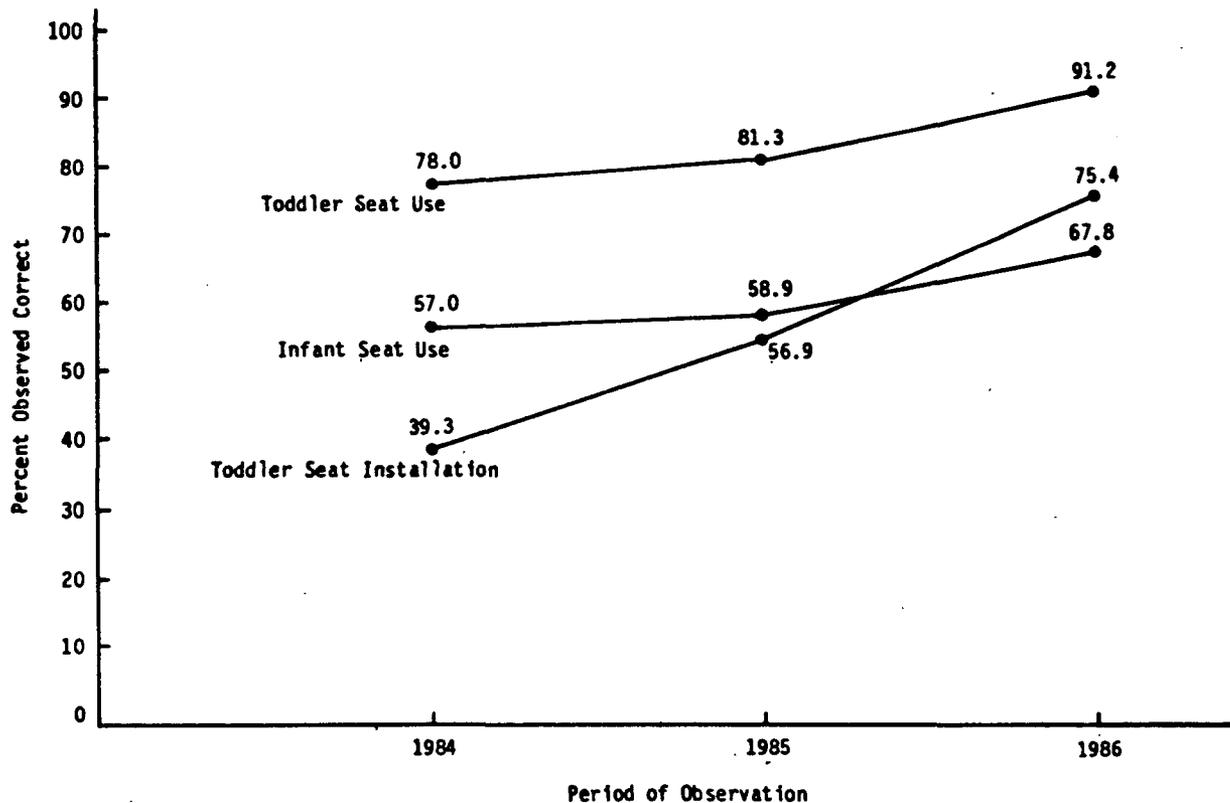


Figure 2. Correct use and installation of safety seats by year.

INTRODUCTION

This report presents the annual findings based on field observations collected over a 12-month period from January through December, 1986. During this period the use of occupant restraints including both safety belts and child safety seats were observed for over 208,000 drivers and passengers in over 180,000 passenger vehicles in 19 cities across the nation. Also during this time, helmet usage was recorded for operators and passengers of over 8,500 motorcycles.

1. 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.

2. Study Description

The study consisted of conducting four independent studies on occupant restraint use for various segments of the traffic population. The studies were: (1) driver safety belt use and shoulder belt misuse; (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.

a. Drivers in the Traffic Population (Driver Study)

The purpose of this study was 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 were:

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

b. Passengers in the Traffic Population (Passenger Study)

The purpose of this study was to monitor the use of occupant restraint systems by passengers of private passenger cars at exits/entrances of selected shopping malls. Special emphasis was 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 were:

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

c. Installation Characteristics of Child Safety Seats (Parking Lot Study)

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

- 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).
- Identification of model.
- Type of safety seat (infant, toddler or booster).

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

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

METHODOLOGY

This study was a continuation of earlier studies conducted for the National Highway Traffic Safety Administration (NHTSA). In this study, data were to be collected over a 26-month period from November, 1984 through December, 1986 in the same 19 cities previously surveyed [1,2,3].

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.

1. 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.

a. 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 in the current effort.

Data Collection Sites

The 19 cities in which data were 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 3.

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.

This schedule was based on the requirement to complete data collection activities at all sites in all cities during a 6-month period. Each city required approximately 13.5 days of data collection for completion,

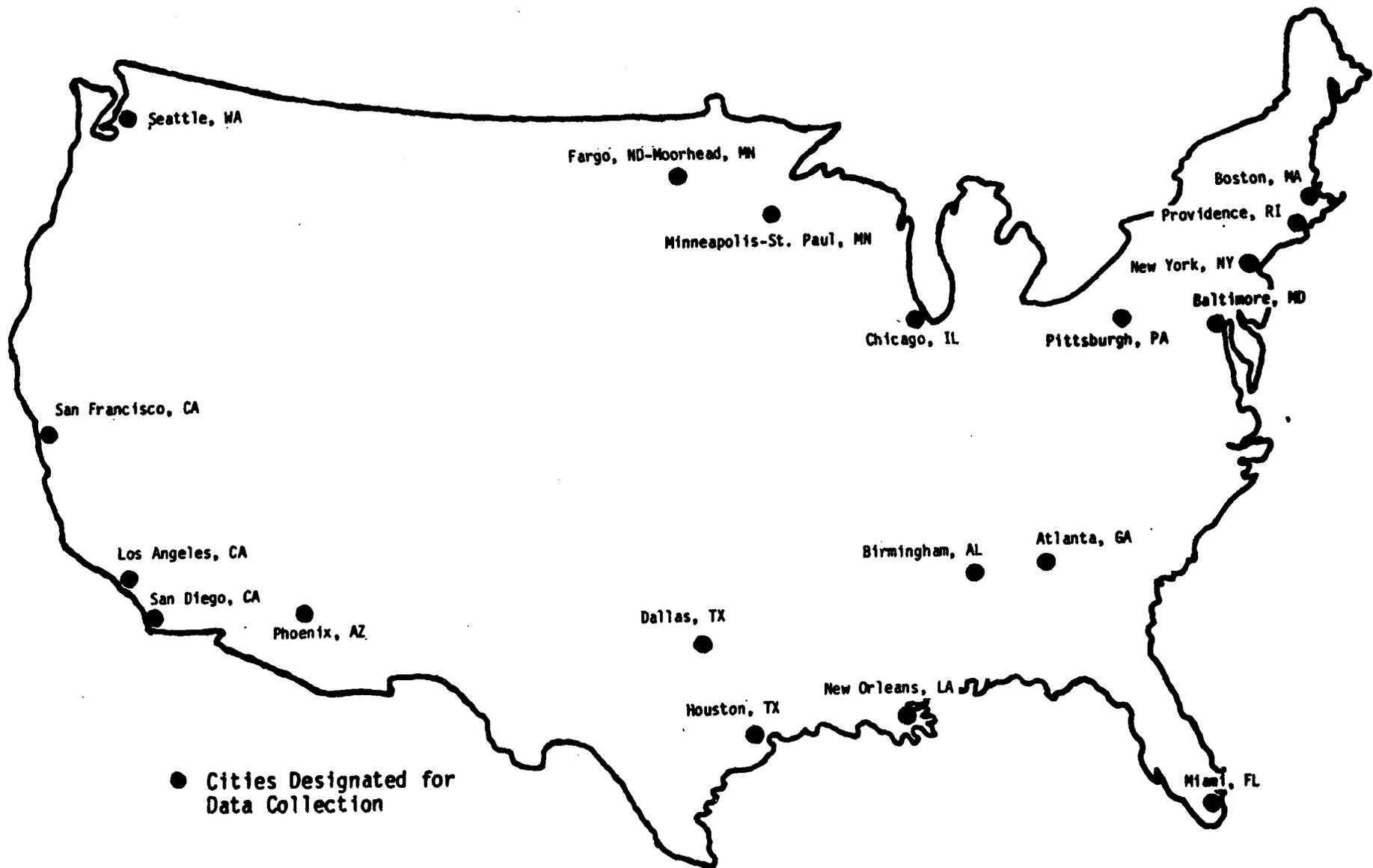


Figure 3 Location of the 19 cities for restraint usage observation.

consisting of approximately 7.5 days of driver study and 6 days of passenger study. Helmet study observations were recorded throughout the data collection stay as motorcycles and mopeds were observed.

The sites used for data collection in the driver study were 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 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.^[1] 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).

A list of 10 randomly selected, controlled intersection sites for each of the selected 22 primary and 11 freeway grids were given to an observer. On the first trip to the city, the observer visited the first site listed within his pre-assigned grid. If the site was suitable for safety belt observation (i.e., roadway curbs, sufficient traffic, observer safety, no construction, etc.), then the site was selected to represent the grid. If the first site was not acceptable then the observer inspected the next site on the list and repeated the process until an acceptable site was found.

In this study, data were 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 used within each city. Many of these malls were originally selected by Opinion Research Corporation to simultaneously provide a mix of socio-economic levels, sufficient traffic flow and good vantage points for conducting observations.

A typical observation day consisted of a minimum of six hours of data collection. For the driver study, 1.5 hours were spent at each of 4 sites per day. The passenger study required 6 hours per day at a single shopping center during hours of operation. The driver study was usually conducted on Monday through Thursday and the passenger study on Friday through Sunday.

Data Forms and Procedures

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

Driver study procedures required data observers to collect data for a minimum of six hours per day; 1.5 hours at each of four sites. Collection site assignments were made by supervisory staff and consisted of a specific date and time of day for each location. Time of day assignments corresponded 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 were deployed to a given site on the same day and during the same time period each time the city was visited. Only privately-owned passenger cars and station wagons with in-state license plates were eligible for the driver study. Trucks, taxi cabs, and marked company-owned cars (i.e., those used for commercial purposes) were not eligible.

The target observation at signalized intersections was the second car that stopped at the traffic signal in the near lane (curb lane). If time permitted, additional observations were made (i.e., the third and fourth stopped cars). However, if only one car stopped then that vehicle was observed. Any vehicle that stopped at a stop sign controlled location was eligible for observation. Observers did not go on the roadway and were only responsible for observing the cars in the curb lane.

Passenger study procedures required data observers to conduct six hours of data collection for each day of the passenger study. Data were collected on Fridays, Saturdays and Sundays when stores at the shopping centers were open for business and during six consecutive hours of the greatest traffic movement in and out of the malls. This maximized the chance of obtaining observations on infants and toddlers. For each six-month data collection period, six passenger study days were conducted in each city.

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

Data collectors were positioned at curbside, at a stop sign or signal controlled exit from the shopping center with the greatest flow of traffic. Observers did not go on the roadway and were only responsible for observing the cars in the curb lane.

Procedures for the study of child safety seat installation required observation of parked vehicles containing one or more safety seats (i.e., infant, toddler or booster safety seats) in shopping center parking lots. The study was conducted for approximately two hours per week on the normally scheduled days of the passenger restraint study. Observations were

recorded during peak store hours when the parking lots were generally full. Upon completion of this study, the passenger study was conducted for the remainder of the day. This study did not change the daily, weekly or monthly data collection schedule.

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

b. 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 instruction 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.

2. Observer and Supervisor Training

Field personnel consisted of three 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 was 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 were made at least twice per year and more frequently when the need arose.

3. Data Collection

One data collection cycle (i.e., data collected at all sites in all 19 cities) was completed every six months. Each observer collected data in 6 to 7 cities during each data collection cycle.

The supervisor was stationed in Detroit and was responsible for scheduling observer activities, supervising data entry and conducting data quality control activities at field locations. Supervisory visits to each region were made on a routine basis or when the data collector or supervisor believed such a visit was warranted. During 1986, 12 days of supervisor visits were conducted. During these visits, field activities and observation techniques were monitored, procedural questions were answered, and observer accuracy and productivity were reviewed. Accuracy checks consisted of the supervisor and observer collecting data independently on the same vehicles for both the driver and passenger study. Discrepancies were identified and discussed during the accuracy review.

4. Data Analysis

At the end of each week, data forms were submitted by the observers for review and analysis. Data summaries were generated on a monthly basis and submitted to NHTSA. Additional information and analyses were also provided to NHTSA upon request.

ANNUAL FINDINGS

The findings presented in this chapter are based on an analysis of data collected during the period of January through December, 1986.

1. Driver Study Findings: Safety Belt Use

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 many mandatory safety belt use laws went into effect in 1986. The following summaries, therefore, include data collected in cities with such laws.

a. 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 (36.7 percent) was observed in 1986. This driver safety belt usage rate of 36.7 percent consisted of 36.3 percent for lap and shoulder belt use and 0.4 percent for lap belt use only.

b. Safety Belt Use by City and Observation Period

In 1986, driver safety belt usage for the 19 cities was 36.7 percent. Driver safety belt usage rates by city and observation period are shown in Table 1. Annual usage rates ranged from a high of 69.0 percent in Dallas to a low of 13.9 percent in Fargo/Moorhead (Table 1). The rank ordering of city usage rates shown in Table 1 are different from those obtained in the 1981-82 study [1], 1983 study [2], 1984 study [3], and 1985 study [4] due to the numerous cities impacted by mandatory safety belt use laws in 1986.

Safety belt usage was also recorded for front-outboard passengers in the driver study, as shown in Table 2, by city and observation period. The annual usage rate for front-outboard passengers over one year of age (i.e., excluding infants) was 30.2 percent, which is 6.5 percent lower than the annual driver usage rate. Safety belt usage rates for front-outboard passengers were lower in each city than for drivers in the same city (Table 2 versus Table 1).

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

City	First Half			Second Half			Total	
	Month	Base	Percent Restrained	Month	Base	Percent Restrained	Base	Percent Restrained
Dallas	Jan.*	2,966	70.9	July*	2,940	67.1	5,906	69.0
Houston	Feb.*	2,924	70.1	Aug.*	2,937	63.9	5,861	67.0
San Francisco	June*	2,955	52.6	Nov.*	2,551	52.6	5,506	52.6
San Diego	May*	2,999	50.9	Dec.*	2,549	52.1	5,548	51.4
Baltimore	May	2,369	28.5	Oct.*	2,559	60.8	4,928	45.3
Los Angeles	May*	2,840	45.2	Nov.*	2,892	39.1	5,732	42.1
Seattle	April	2,993	35.2	Oct.*	2,706	46.5	5,699	40.6
Boston	April*	2,130	42.3	Sept.*	2,416	36.1	4,546	39.0
Minn./St. Paul	March	2,858	24.6	Aug.*	2,878	49.7	5,736	37.2
Phoenix	April	2,993	28.7	Sept.	2,790	33.7	5,783	31.1
New York	Feb.*	2,177	25.8	July*	2,339	35.2	4,516	30.6
New Orleans	June	2,749	18.5	Nov.*	2,774	38.7	5,523	28.7
Miami	June	2,287	23.7	Dec.*	2,851	28.8	5,138	26.5
Chicago	Jan.*	3,005	26.8	July*	2,930	25.7	5,935	26.2
Pittsburgh	April	2,855	22.7	Oct.	2,797	26.2	5,652	24.4
Birmingham	March	2,797	21.1	Aug.	2,763	24.0	5,560	22.5
Atlanta	Feb.	2,799	19.7	Sept.	2,819	23.8	5,618	21.8
Providence	March	2,014	11.8	Aug.	2,320	17.2	4,334	14.7
Fargo/Moorhead	Jan.	2,103	11.8	July	2,273	15.9	4,376	13.9
Total		50,813	34.2		51,084	39.2	101,897	36.7

* Denotes mandatory safety belt use law in effect.

Table 2. Front-outboard passenger safety belt usage by city and observation period.

City	First Half			Second Half			Total	
	Month	Base	Percent Restrained	Month	Base	Percent Restrained	Base	Percent Restrained
Dallas	Jan.*	480	71.7	July*	652	60.7	1,132	65.4
Houston	Feb.*	457	69.5	Aug.*	692	59.1	1,149	63.3
San Francisco	June*	551	46.8	Nov.*	480	43.8	1,031	45.4
San Diego	May*	493	42.4	Dec.*	547	47.2	1,040	44.9
Baltimore	May	547	20.7	Oct.*	533	57.0	1,080	38.6
Seattle	April	417	33.6	Oct.*	508	36.6	925	35.2
Boston	April*	524	36.8	Sept.*	505	32.7	1,029	34.8
Minn./St. Paul	March	585	18.6	Aug.*	726	47.0	1,311	34.3
Los Angeles	May*	651	34.8	Nov.*	717	28.3	1,368	31.4
New York	Feb.*	675	25.0	July*	684	31.9	1,359	28.5
Phoenix	April	383	26.9	Sept.	414	25.6	797	26.2
New Orleans	June	886	16.1	Nov.*	829	34.1	1,715	24.8
Chicago	Jan.*	765	20.1	July*	779	21.1	1,544	20.6
Pittsburgh	April	712	17.7	Oct.	668	20.7	1,380	19.1
Miami	June	500	16.6	Dec.*	688	20.6	1,188	18.9
Birmingham	March	445	16.4	Aug.	560	17.9	1,005	17.2
Atlanta	Feb.	594	13.8	Sept.	620	15.2	1,214	14.5
Fargo/Moorhead	Jan.	618	11.5	July	802	15.1	1,420	13.5
Providence	March	545	8.6	Aug.	613	16.3	1,158	12.7
Total		10,828	27.3		12,017	32.8	22,845	30.2

* Denotes mandatory safety belt use law in effect.

c. Safety Belt Use by Existence of Mandatory Use Law (MUL)

Driver safety belt usage rates, based on whether or not a mandatory safety belt use law (MUL) was in effect at the time of data collection, are shown in Table 3. As shown in this table, driver usage rates associated with MUL were much higher than those without MUL (47.1 percent versus 23.3 percent for the entire year).

Table 3. Driver safety belt usage by existence of mandatory use law (MUL).

MUL Existence	First Half		Second Half		Total	
	Base	Percent Restrained	Base	Percent Restrained	Base	Percent Restrained
Yes	21,996	49.0	35,322	46.0	57,318	47.1
No	28,817	23.0	15,762	23.9	44,579	23.3
Total	50,813	34.2	51,084	39.2	101,897	36.7

d. Safety Belt Use by Vehicle Model Year

License plate numbers recorded during the driver study for the period January through June, 1986 were submitted to the various state departments of motor vehicles (DMV's) for the purpose of obtaining vehicle information. A total of 48,014 license plate numbers were submitted to 15 states DMV's. The DMV's returned 42,459 vehicle records which were processed with the "Vindicator" program by the Highway Loss Data Institute of Washington, D.C.(5). Valid vehicle information for 34,989 vehicles (including vehicle make, model, model year, and size) were obtained for the model years 1967-1987 (pre-1967 vehicles were observed but could not be processed by the Vindicator program). A more thorough discussion of this process can be found in the section, "Analysis of Key Variables" on page 26.

Table 4 gives driver safety belt usage rates for vehicles observed between January, 1986 and June, 1986 and verified by the State DMV's. Overall, 39.1 percent of drivers in this data subset were observed using safety belts. The data indicates that drivers of newer model cars, beginning in 1978, are more likely to wear safety belts than their counterparts in older model cars. Driver safety belt usage by manufacturer's division for model years 1978-1987 is presented in Appendix A.

Table 4. Driver safety belt usage by model year.

Model Year	Base	Percent Restrained
1967	118	2.5
1968	169	5.3
1969	244	10.7
1970	278	10.4
1971	325	13.2
1972	548	10.6
1973	765	11.6
1974	895	15.1
1975	912	20.6
1976	1,464	17.8
1977	2,062	20.9
1978	2,299	24.4
1979	2,717	25.9
1980	2,359	30.5
1981	2,607	39.4
1982	2,694	42.8
1983	3,108	44.6
1984	4,637	43.1
1985	4,807	46.3
1986/87	1,981	44.3
Total	34,989	34.1

e. Safety Belt Use By Restraint System Type

Observed safety belt usage, stratified by type of safety belt system is shown in Table 5. Passive (automatic) safety belt systems comprised less than 1 percent of all driver observations and resulted in a usage rate of 91.7 percent. Manual system usage varied from 10.5 percent for separate systems to 35.6 percent for combination systems. The 1986 usage rates for all of these systems increased from 1985. 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 5. Driver safety belt usage by safety belt system type.

Safety Belt System Type	Base	Percent Restrained
Automatic (Passive) Safety Belt	145	91.7
Lap/Shoulder Combination with Inflatable Bags	31	29.0
Lap/Shoulder Combination (Model Years 1974-1987)	32,366	35.6
Lap/Shoulder Separate (Model Years 1967-1973)	2,447	10.5

Table 6 summarizes data obtained on specific vehicle types that offer passive seat belt systems as an option. These data are presented for all unverified driver data collected in 1986 and verified driver data for model years 1978-1987. Toyota experienced a passive safety belt usage rate of 94.3 percent while the VW Rabbit/Jetta had a rate of 84.6 percent. Although passive safety belt systems are also an option on the Chevrolet Chevette, no Chevetttes with such a system were part of the verified data base.

Table 6. Driver safety belt usage for vehicles with passive safety belt systems.

Vehicles Make/System Type	Unverified		Verified	
	Base	Percent Restrained	Base	Percent Restrained
VW Rabbit/Jetta - Automatic	303	89.4	39	84.6
VW Rabbit/Jetta - Manual	861	42.5	377	53.1
Toyota - Automatic	272	97.1	106	94.3
Toyota - Manual	5,997	49.4	1,926	50.6

f. Safety Belt Use by Driver Gender

Observed safety belt use stratified by driver gender are presented in Table 7. This table indicates that female drivers were more likely to wear safety belts than male drivers, both with and without mandatory use laws in effect. The 1985 study also indicated that females are more likely than males to wear safety belts.

Table 7. Driver safety belt usage by driver gender.

Driver Gender	Without MUL		With MUL		Total	
	Base	Percent Restrained	Base	Percent Restrained	Base	Percent Restrained
Male	27,454	20.0	36,686	43.0	64,140	33.1
Female	17,125	28.5	20,632	54.6	37,757	42.8
Total	44,579	23.3	57,318	47.1	101,897	36.7

g. Safety Belt Use by Driver Age

Table 8 shows that safety belt usage was highest among the 25 to 49 year age group both with and without mandatory use laws in effect. This age group was the only "above average" group. The relative rankings between age groups are similar to those obtained from the 1985 study.

Table 8. Driver safety belt usage by age group.

Age Group	Without MUL		With MUL		Total	
	Base	Percent Restrained	Base	Percent Restrained	Base	Percent Restrained
Under 20	2,323	13.7	1,699	30.3	4,022	20.7
20-24	5,623	22.6	6,404	41.6	12,027	32.7
25-49	25,633	25.3	36,411	49.2	62,044	39.3
50 or over	11,000	21.0	12,804	46.5	23,804	34.7
Total	44,579	23.3	57,318	47.1	101,897	36.7

h. 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 9 and 10. 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 9 presents the relationship between safety belt usage, vehicle make and vehicle size when all model years were included. This table shows that drivers of smaller size vehicles (i.e., subcompacts and compacts) were 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. However, the difference in driver safety belt usage between imported and domestic vehicles was affected by model year (refer to Table 23, page 30). Further investigation of Table 9 reveals that approximately 80 percent of the imported vehicles observed were subcompacts. In fact, imported subcompacts accounted for over 20 percent of all observations. This finding, along with the high usage rate (45.5 percent) associated with these vehicles, as compared to other vehicles, demonstrates the impact that imported subcompacts have on driver usage rates. When only newer model cars (1978-1987) were considered, similar but slightly higher usage rates were observed. This is shown in Table 10.

Table 9. Driver safety belt usage by vehicle make and vehicle size for all model years.

Vehicle Size	Vehicle Make		Total
	Domestic	Import	
Subcompact	35.8% (5,941)	45.5% (7,452)	41.2% (13,393)
Compact	31.6% (10,017)	54.8% (1,715)	35.0% (11,732)
Intermediate	24.4% (7,145)	47.1% (223)	25.1% (7,368)
Full Size	17.8% (2,473)	34.8% (23)	18.0% (2,496)
Total	29.2% (25,576)	47.2% (9,413)	34.1% (34,989)

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

Table 10. Driver safety belt usage by vehicle make and vehicle size for 1978-1987 model years.

Vehicle Size	Vehicle Make		Total
	Domestic	Import	
Subcompact	37.3% (5,487)	49.0% (6,214)	43.5% (11,701)
Compact	35.0% (8,348)	56.2% (1,555)	38.3% (9,903)
Intermediate	31.3% (4,478)	46.8% (218)	32.0% (4,696)
Full Size	28.7% (886)	34.8% (23)	28.8% (909)
Total	34.5% (19,199)	50.3% (8,010)	39.2% (27,209)

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

i. 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 11. Drivers of Honda vehicles were observed wearing safety belts in 53.8 percent of the observations; the highest of any manufacturer. Drivers of General Motors products experienced the highest usage rates of the domestic vehicle manufacturers.

When the older model vehicles were removed from the data summaries, Honda and GM again displayed the highest driver usage rates for import and domestic manufacturers, respectively (Table 12).

Table 11. Driver safety belt usage by vehicle manufacturer for all model years.

Vehicle Manufacturer	Base	Percent Restrained
AMC	518	26.3
Chrysler	2,836	27.5
Ford	6,331	29.1
GM	15,891	29.7
VW	1,135	40.9
Toyota	2,315	49.8
Datsun/Nissan	1,746	41.0
Honda	1,417	53.8
Other Imports	2,800	48.3
Total	34,989	34.1

Table 12. Driver safety belt usage by vehicle manufacturer for 1978 - 1987 model years.

Vehicle Manufacturer	Base	Percent Restrained
AMC	359	30.4
Chrysler	1,996	33.3
Ford	4,708	34.3
GM	12,136	34.9
VW	593	54.5
Toyota	2,032	52.9
Datsun/Nissan	1,484	43.3
Honda	1,338	54.6
Other Imports	2,563	48.9
Total	27,209	39.1

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 13 and 14 illustrate driver safety belt usage rates for all model years (based on the Vindicator program outputs) and for newer model years (1978 - 1987), respectively. Table 13 shows that the Oldsmobile and Buick divisions of General Motors Corporation had the highest usage rates while the Dodge division of Chrysler Corporation had the lowest among the three largest domestic manufacturers. Table 13 shows similar usage rates for the subset of newer model years from 1978 to 1987. All divisions showed between four and eight percent higher usage rates for newer models as compared to all models. Driver safety belt usage by manufacturer's division and model year (1978-1987) are provided in Appendix A and safety belt usage by car series is presented in Appendix B.

Table 13. Driver safety belt usage by manufacturer's division for all model years.

Manufacturer's Division	Base	Percent Restrained
● Chrysler		
Chrysler	649	29.1
Dodge	1,024	25.4
Plymouth	955	26.4
● Ford		
Ford	4,271	28.2
Lincoln	440	26.8
Mercury	1,208	30.3
● GM		
Buick	2,734	31.7
Cadillac	1,512	31.3
Chevrolet	5,844	27.8
Oldsmobile	3,244	31.9
Pontiac	1,916	26.4

Table 14. Driver safety belt usage by manufacturer's division for 1978 - 1987 model years.

Manufacturer's Division	Base	Percent Restrained
● Chrysler		
Chrysler	528	33.5
Dodge	690	30.7
Plymouth	574	34.3
● Ford		
Ford	3,037	34.0
Lincoln	346	31.8
Mercury	913	35.3
● GM		
Buick	2,177	36.8
Cadillac	1,144	36.0
Chevrolet	4,156	33.6
Oldsmobile	2,607	36.6
Pontiac	1,454	31.9

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

j. Safety Belt Use By Time of Day

Table 15 compares 1985 and 1986 usage rates stratified by the four daily data collection periods. It can be seen that in 1986, usage rates among the four time periods were similar. This finding is consistent with the results of the 1985 study.

Table 15. Driver safety belt usage by time period.

Time Period	1985		1986	
	Base	Percent Restrained	Base	Percent Restrained
7 - 10 a.m.	26,461	21.2	25,675	37.6
10 a.m. - 1 p.m.	23,821	22.2	25,976	36.4
1 - 4 p.m.	32,603	21.0	27,575	35.4
4 - 7 p.m.	13,486	21.1	22,671	37.7
Total	96,371	21.4	101,897	36.7

k. Safety Belt Use By Site Characteristics

Driver safety belt usage rates stratified by site type and area type, are shown in Tables 16 and 17, respectively. Table 16 indicates that driver safety belt usage was higher on freeways than on non-freeway facilities. This characteristic was also present in the 1985 study.

Table 16. Driver safety belt usage by site type.

Site Type	Base	Percent Restrained
Primary Road	73,723	35.1
Freeway Exit	28,174	41.0
Total	101,897	36.7

Safety belt use in city areas versus suburbs is shown in Table 17. City areas are characterized as central business district areas while suburb areas include commercial, industrial or residential areas outside of the central city area. The current rates show that drivers were only slightly more likely to use safety belts in the city. Study findings in 1985 displayed a similar difference in rates between city and suburb areas.

Table 17. Driver safety belt usage by area type.

Area Type	Base	Percent Restrained
City	68,397	37.4
Suburb	33,500	35.3
Total	101,897	36.7

l. Vehicle Occupancy

Safety belt use observations were only recorded for drivers and front-outboard passengers 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 76.1 percent of the 101,897 vehicles observed were occupied by only the driver. Table 18 shows the passenger occupancy rates for all observed vehicles.

Table 18. Occupancy for vehicles observed in the driver study.

Passenger Occupancy Per Vehicle	Observed	Percent of Total
0	77,578	76.1
1	20,446	20.1
2	2,761	2.7
3	862	0.8
4 or more	250	0.2
Total	101,897	100.0

Table 19 shows the age distribution of passengers as observed in the driver study. Of the 101,897 vehicles observed, less than one percent had an infant passenger. The percentage of cars with passengers in the four other age categories were: toddlers 1.1 percent; subteens 2.5 percent; teens 2.4 percent; and adults 19.4 percent. These percentages represent the distribution of passengers in the traffic population as opposed to passenger distribution obtained in the passenger study, where observers were instructed to concentrate primarily on vehicles with toddlers and infants at shopping centers. In the driver study, the observers sampled from the second car stopped for a traffic signal.

Table 19. Percent of cars with passengers by age group in the driver study.

Age Group	Percent of Vehicles
Infants (less than 1 year)	0.1
Toddlers (1-4 years)	1.1
Subteens (5-12 years)	2.5
Teens (13-19 years)	2.4
Adults (20 and older)	19.4

Table 20 shows the occupancy rate for each seating position by age group. In 60.9 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 (9.8 percent).

Table 20. 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	--	10	0.0	36	0.0	7	0.0	11	0.0	4	0.0
Toddler	0	--	140	0.3	182	0.2	287	0.3	332	0.3	290	0.3
Subteen	0	--	184	0.2	1,380	1.4	599	0.6	439	0.4	640	0.6
Teen	4,022	3.9	93	0.1	2,030	2.0	296	0.3	103	0.1	491	0.5
Adult 20-24	12,027	11.8	66	0.1	2,566	2.5	104	0.1	25	0.0	215	0.2
Adult 25-49	62,044	60.9	116	0.1	10,012	9.8	434	0.4	65	0.1	594	0.6
Adult 50 or over	23,804	23.4	37	0.0	6,857	6.7	285	0.3	41	0.0	520	0.5
Two occupants	0	--	0	--	5	0.0	1	0.0	0	--	0	--
Empty	0	--	101,251	99.4	78,829	77.5	99,884	98.0	100,881	99.0	99,143	97.3
Total	101,897	100.0	101,897	100.0	101,897	100.0	101,897	100.0	101,897	100.0	101,897	100.0

m. Analysis of Key Variables

During the six-month period from January through June, 1986 a total of 50,813 driver observations were recorded. The license plate data from 48,014 of these records were forwarded to 15 of the 16 State Department of Motor Vehicles (DMV). This was the first step in a process to obtain a "verified" subset of driver safety belt usage data. License plate data were not sent to the State of Georgia due to the absence of the necessary program to analyze the data. Data received from the various DMV's were sent to the Highway Loss Data Institute where they were analyzed with the Vindicator program.[5] 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 34,989 observations recorded over the six-month period. The 34,989 verified observations represent 72.9 percent of the 48,014 observations made in 18 of the 19 cities (i.e., excluding Atlanta). The remaining 27.1 percent could not be verified for a number of reasons. These reasons included 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.

The previous studies identified a number of key variables as "predictors" of driver safety belt usage.[1,2,3,4] These variables were:

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

To allow a basis for comparison between the 1985 study and the current study, the above variables (excluding data collection region due to the presence or absence of mandatory use laws) are presented as pairwise summaries in Tables 21 through 30. The major findings of these summaries, with the exception of data collection region, support the predictability of these key variables. These summaries do not reflect the entire verified data base of 34,989 observations, since this base includes data on pre-1978 model year vehicles. The summaries are based on a total of 27,209 verified observations for vehicle model years 1978-1987. The driver safety belt usage rate for this data base was 39.1 percent compared to 36.7 percent for the 101,897 observations that represent the entire 1986 driver study data base.

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

- Driver safety belt usage increased consistently among each gender as model year increased.
- Safety belt usage for female drivers of 1978-1987 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 1985 study.

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

- Driver safety belt usage increases were relatively consistent among each age group as vehicle model year increased.
- Drivers aged 25 to 49 years generally have a higher safety belt usage than any other age group for each model year.
- The findings of this comparison are similar to the findings of the 1985 study.

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

- 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 1985 study.

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

- 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 1985 study.

Table 21. Driver safety belt usage by model year (1978-1987) and driver gender.

Driver Gender	Model Year									Total
	1978	1979	1980	1981	1982	1983	1984	1985	1986/87	
Male	21.2% (1,439)	22.6% (1,683)	26.5% (1,392)	35.6% (1,545)	38.9% (1,563)	41.1% (1,864)	39.1% (2,830)	42.8% (2,936)	41.3% (1,300)	35.5% (16,552)
Female	29.7% (860)	31.3% (1,034)	36.3% (967)	45.0% (1,062)	48.1% (1,131)	49.8% (1,244)	49.4% (1,807)	51.8% (1,871)	49.5% (681)	44.8% (10,657)
Total	24.4% (2,299)	25.9% (2,717)	30.5% (2,359)	39.4% (2,607)	42.8% (2,694)	44.6% (3,108)	43.1% (4,637)	46.3% (4,807)	44.1% (1,981)	(27,209)

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 (1978-1987) and driver age.

Driver Age	Model Year									Total
	1978	1979	1980	1981	1982	1983	1984	1985	1986/87	
19 or under	14.6% (103)	17.0% (141)	23.7% (97)	23.5% (98)	24.4% (86)	28.2% (78)	22.6% (102)	23.7% (93)	40.7% (27)	22.3% (825)
20-24	21.1% (266)	27.0% (355)	29.1% (330)	35.1% (276)	41.9% (291)	39.6% (303)	42.5% (473)	41.7% (436)	37.9% (206)	35.7% (2,936)
25-49	25.6% (1,349)	26.0% (1,581)	31.7% (1,363)	42.9% (1,620)	45.8% (1,667)	47.8% (1,966)	46.7% (2,944)	49.5% (3,190)	46.7% (1,294)	42.1% (16,974)
50 or over	24.8% (581)	27.0% (640)	29.7% (569)	34.8% (613)	37.9% (650)	40.0% (761)	35.7% (1,118)	40.6% (1,088)	39.9% (454)	35.1% (6,474)
Total	24.4% (2,299)	25.9% (2,717)	30.5% (2,359)	39.4% (2,607)	42.8% (2,694)	44.6% (3,108)	43.1% (4,637)	46.3% (4,807)	44.1% (1,981)	38.8% (27,209)

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 (1978-1987) and make.

Make	Model Year									Total
	1978	1979	1980	1981	1982	1983	1984	1985	1986/87	
Domestic	20.1% (1,840)	21.6% (2,105)	25.4% (1,641)	34.1% (1,790)	38.9% (1,819)	40.3% (2,084)	39.3% (3,218)	42.2% (3,324)	40.5% (1,378)	34.5% (19,199)
Import	41.6% (459)	40.9% (612)	42.3% (718)	51.2% (817)	50.7% (875)	53.3% (1,024)	51.7% (1,419)	55.6% (1,483)	52.4% (603)	50.3% (8,010)
Total	24.4% (2,299)	25.9% (2,717)	30.5% (2,359)	39.4% (2,607)	42.8% (2,694)	44.6% (3,108)	43.1% (4,637)	46.3% (4,807)	44.1% (1,981)	(27,209)

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

Table 24. Driver safety belt usage by model year (1978-1987) and vehicle size.

Vehicle Size	Model Year									Total
	1978	1979	1980	1981	1982	1983	1984	1985	1986/87	
Subcompact	36.6% (612)	36.5% (817)	37.5% (988)	43.9% (1,101)	45.9% (1,299)	46.0% (1,386)	43.0% (2,266)	47.3% (2,324)	44.7% (908)	43.5% (11,701)
Compact	19.2% (879)	23.0% (1,003)	27.1% (952)	37.9% (1,025)	40.6% (844)	44.9% (1,073)	46.8% (1,505)	46.9% (1,769)	45.6% (853)	38.3% (9,903)
Intermediate	20.4% (618)	20.5% (756)	22.6% (350)	32.8% (396)	37.7% (459)	41.7% (542)	37.0% (740)	41.9% (642)	36.3% (193)	32.0% (4,696)
Full Size	21.6% (190)	14.2% (141)	18.8% (69)	31.8% (85)	43.5% (92)	36.5% (107)	34.9% (126)	40.3% (72)	33.3% (27)	28.8% (909)
Total	24.4% (2,299)	25.9% (2,717)	30.5% (2,359)	39.4% (2,607)	42.8% (2,694)	44.6% (3,108)	43.1% (4,637)	46.3% (4,807)	44.1% (1,981)	38.3% (27,209)

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 Gender (Table 25)

- Driver safety belt usage among imports was higher than safety belt usage among domestic cars for each gender.
- 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 1985 study.

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

- Driver safety belt usage among imports was higher than restraint usage among domestic cars for each age group.
- The age group of 25 to 49 experienced the highest driver safety belt usage for both domestic and imported cars.
- The findings of this comparison are similar to the findings from the 1985 study.

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

- 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 increased as vehicle size decreased for domestic vehicles. This finding was not consistent for imported vehicles.
- The findings of this comparison are similar to the findings from the 1985 study.

Table 25. Driver safety belt usage by vehicle make and driver gender.
(1978-1987 model years)

Driver Gender	Vehicle Make		Total
	Domestic	Import	
Male	31.7% (11,942)	45.3% (4,610)	35.5% (16,552)
Female	39.0% (7,257)	57.1% (3,400)	44.8% (10,657)
Total	34.5% (19,199)	50.3% (8,010)	(27,209)

Table 26. Driver safety belt usage by vehicle make and driver age.
(1978-1987 model years)

Driver Age	Vehicle Make		Total
	Domestic	Import	
19 or under	14.5% (477)	33.1% (348)	22.3% (825)
20-24	28.0% (1,735)	46.9% (1,201)	35.7% (2,936)
25-49	36.8% (11,457)	53.0% (5,517)	42.1% (16,974)
50 or over	33.4% (5,530)	45.0% (944)	35.1% (6,474)
Total	34.5% (19,199)	50.3% (8,010)	(27,209)

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

Table 27. Driver safety belt usage by vehicle make and vehicle size.

(1978-1987 model years)

Vehicle Size	Vehicle Make		Total
	Domestic	Import	
Subcompact	37.3% (5,487)	49.0% (6,214)	43.5% (11,701)
Compact	35.0% (8,348)	56.2% (1,555)	38.3% (9,903)
Intermediate	31.3% (4,478)	46.8% (218)	32.0% (4,696)
Full Size	28.7% (886)	34.8 (23)	28.8% (909)
Total	34.5% (19,199)	50.3% (8,010)	(27,209)

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 Gender (Table 28)

- Driver safety belt usage for each gender 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 1985 study.

Driver Safety Belt Usage by Vehicle Size and Driver Age (Table 29)

- Driver safety belt usage for each age group decreased as vehicle size increased.
- Drivers aged 25 to 49 years have a higher safety belt usage than any other age group for each vehicle size.
- The findings of this comparison are similar to the findings from the 1985 study.

Driver Safety Belt Usage by Driver Gender and Driver Age (Table 30)

- 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 gender.
- The findings of this comparison are similar to the findings from the 1985 study.

In summary, the variables presented in this section, independent of each other, have consistently proven to be true "predictors" of driver safety belt usage.

Table 28. Driver safety belt usage by vehicle size and driver gender.
(1978-1987 model years)

Driver Gender	Vehicle Size				Total
	Subcompact	Compact	Intermediate	Full Size	
Male	39.8% (6,609)	34.8% (6,084)	29.6% (3,198)	27.4% (661)	35.5% (16,552)
Female	48.3% (5,092)	43.9% (3,819)	37.1% (1,498)	32.7% (248)	44.8% (10,657)
Total	43.5% (11,701)	38.3% (9,903)	32.0% (4,696)	28.8% (909)	(27,209)

Table 29. Driver safety belt usage by vehicle size and driver age.
(1978-1987 model years)

Driver Age	Vehicle Size				Total
	Subcompact	Compact	Intermediate	Full Size	
19 or under	26.1% (574)	15.5% (194)	7.6% (53)	0.0% (4)	22.3% (825)
20-24	40.4% (1,842)	28.8% (826)	26.1% (234)	14.7% (34)	35.7% (2,936)
25-49	46.4% (7,640)	41.3% (6,171)	33.5% (2,658)	32.5% (505)	42.1% (16,974)
50 or over	39.6% (1,645)	36.1% (2,712)	31.2% (1,751)	25.4% (366)	35.1% (6,474)
Total	43.5% (11,701)	38.3% (9,903)	32.0% (4,696)	28.8% (909)	(27,209)

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

Table 30. Driver safety belt usage by driver gender and driver age.
 (1978-1987 model years)

Driver Age	Driver Gender		Total
	Male	Female	
19 or under	20.4% (460)	24.7% (365)	22.3% (825)
20-24	33.3% (1,718)	39.1% (1,218)	35.7% (2,936)
25-49	37.6% (9,874)	48.3% (7,100)	42.1% (16,974)
50 or over	33.2% (4,500)	39.3% (1,974)	35.1% (6,474)
Total	35.5% (16,552)	44.8% (10,657)	(27,209)

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

2. Driver Study Findings: Shoulder Belt Misuse

The following data summaries illustrate the total number of drivers observed wearing the shoulder belt (referred to as "Base") and the percentage of the total base observed misusing the shoulder belt (referred to as "Percent Misused"). Observers classified shoulder belt misuse by one of three categories; under the arm (i.e., under the driver's left arm), behind the back (i.e., positioned behind the right side of the driver's body, resulting in no restraint of the upper torso), and loose (i.e., obviously excessive slack). The following summaries present shoulder belt misuse by each of these categories and also by the sum of these categories (referred to as "Total Percent Misused"), based solely on those drivers observed wearing shoulder belts. Those drivers that were wearing only lap belts in vehicles equipped with separate lap/shoulder systems and those drivers not utilizing any part of the combination lap/shoulder systems were excluded from the following analyses.

a. Shoulder Belt Misuse by Vehicle Model Year

The Vindicator program generated data on 34,989 vehicles observed between January and June, 1986. Drivers in 11,528 of these vehicles were observed utilizing the shoulder belt. Table 31 gives shoulder belt misuse rates by vehicle model year for drivers of these vehicles. Overall, 2.9 percent of drivers utilizing shoulder belts misused them. It can be seen that shoulder belt misuse in recent model year cars, starting with 1980, appears to be less than in early model years.

Table 31. Driver shoulder belt misuse by model year.

Model Year	Base	Percent Misused			Total Percent Misused
		Under Arm	Behind Back	Loose	
1967	2	0.0	0.0	0.0	0.0
1968	7	0.0	0.0	0.0	0.0
1969	25	4.0	8.0	0.0	12.0
1970	26	0.0	0.0	0.0	0.0
1971	38	5.3	2.6	0.0	7.9
1972	56	1.8	1.8	3.6	7.2
1973	81	3.7	0.0	1.2	4.9
1974	131	3.1	1.5	0.0	4.6
1975	186	4.3	0.0	2.2	6.5
1976	259	4.2	0.8	0.4	5.4
1977	431	4.6	1.6	0.5	6.7
1978	556	1.6	0.9	0.5	3.0
1979	701	3.0	0.1	1.7	4.8
1980	718	1.9	0.3	0.6	2.8
1981	1,028	1.6	0.4	0.7	2.7
1982	1,151	1.1	0.7	0.8	2.6
1983	1,383	1.0	0.6	0.9	2.5
1984	1,995	1.1	0.2	0.6	1.9
1985	2,225	1.0	0.2	0.9	2.1
1986/87	873	1.3	0.3	1.0	2.6
Total	11,528	1.6	0.5	0.8	2.9

b. Shoulder Belt Misuse by Driver Gender

Observed shoulder belt misuse by driver gender, based on all drivers observed utilizing the shoulder belt in 1986, are presented in Table 32. This table reveals shoulder belt misuse to be higher for females than males (3.6 percent versus 2.5 percent), due mainly to the difference in "Under Arm" misuse.

Table 32. Driver shoulder belt misuse by driver gender.

Driver Gender	Base	Percent Misused			Total Percent Misused
		Under Arm	Behind Back	Loose	
Male	21,115	1.2	0.5	0.8	2.5
Female	16,078	2.1	0.6	0.9	3.6
Total	37,193	1.6	0.6	0.8	3.0

When only newer model year cars (1984-1987) are considered, similar but slightly lower misuse rates were observed. This is shown in Table 33.

Table 33. Driver shoulder belt misuse by driver gender for 1984-1987 model years.

Driver Gender	Base	Percent Misused			Total Percent Misused
		Under Arm	Behind Back	Loose	
Male	2,895	0.7	0.1	0.7	1.5
Female	2,198	1.6	0.3	0.9	2.8
Total	5,093	1.1	0.2	0.8	2.1

c. Shoulder Belt Misuse by Driver Age

Table 34, based on all drivers observed utilizing the shoulder belt in 1986, indicates that shoulder belt misuse was the highest among the 50 or over age group (4.9 percent). This age group was the only "above average" group and were seen more often wearing the shoulder belt under the arm.

Table 34. Driver shoulder belt misuse by age group.

Age Group	Base	Percent Misused			Total Percent Misused
		Under Arm	Behind Back	Loose	
Under 20	812	1.8	0.5	0.6	2.9
20-24	3,894	1.5	0.4	0.7	2.6
25-49	24,294	1.3	0.5	0.7	2.5
50 or over	8,193	2.7	0.9	1.3	4.9
Total	37,193	1.6	0.6	0.8	3.0

Shoulder belt misuse was slightly less when only newer model year cars (1984-1987) are considered, as shown in Table 35.

Table 35. Driver shoulder belt misuse by age group for 1984-1987 model years.

Age Group	Base	Percent Misused			Total Percent Misused
		Under Arm	Behind Back	Loose	
Under 20	55	3.6	0.0	0.0	3.6
20-24	460	0.9	0.0	0.7	1.6
25-49	3,556	1.0	0.2	0.5	1.7
50 or over	1,022	1.6	0.3	2.0	3.9
Total	5,093	1.1	0.2	0.8	2.1

d. Shoulder Belt Misuse by Vehicle Make (Domestic Versus Import)

Table 36 shows driver shoulder belt misuse, by vehicle make for all model years, based on data generated by the Vindicator program for drivers utilizing the shoulder belt. Drivers of domestic vehicles were much more likely to wear the shoulder belts loosely than drivers of imported vehicles. This is probably due to the "Window Shade" design, used by domestic manufacturers, to remove shoulder belt tension.

Table 36. Driver shoulder belt misuse by vehicle make for all model years.

Vehicle Make	Base	Percent Misused			Total Percent Misused
		Under Arm	Behind Back	Loose	
Domestic	7,431	1.8	0.6	1.3	3.7
Import	4,441	1.3	0.2	0.1	1.6
Total	11,872	1.6	0.5	0.8	2.9

Table 37 shows slightly lower misuse rates by make for recent model year vehicles (1984-1987). However, the large difference between domestics and imports for shoulder belts observed as loose still exists.

Table 37. Driver shoulder belt misuse by vehicle make (domestic versus import) for 1984-1987 model years.

Vehicle Make	Base	Percent Misused			Total Percent Misused
		Under Arm	Behind Back	Loose	
Domestic	3,220	1.2	0.2	1.2	2.6
Import	1,873	1.0	0.2	0.1	1.3
Total	5,093	1.1	0.2	0.8	2.1

e. Shoulder Belt Misuse by Vehicle Size

The relationship between shoulder belt misuse and vehicle size, based on all model years, is shown in Table 38. It can be seen that shoulder belt misuse increases as vehicle size increases for each of the three misuse categories.

Table 38. Driver shoulder belt misuse by vehicle size for all model years.

Vehicle Size	Base	Percent Misused			Total Percent Misused
		Under Arm	Behind Back	Loose	
Subcompact	5,503	1.5	0.3	0.4	2.2
Compact	4,095	1.7	0.4	1.0	3.1
Intermediate	1,834	1.8	0.6	1.4	3.8
Full Size	440	2.5	1.4	1.4	5.3
Total	11,872	1.6	0.5	0.8	2.9

When newer model year cars (1984-1987) were considered, the trend was reversed. That is, shoulder belt misuse was higher for smaller vehicles (i.e., subcompact and compact), as shown in Table 39. Therefore, a relationship between shoulder belt misuse and vehicle size may not exist.

Table 39. Driver shoulder belt misuse by vehicle size for 1984-1987 model years.

Vehicle Size	Base	Percent Misused			Total Percent Misused
		Under Arm	Behind Back	Loose	
Subcompact	2,475	1.3	0.2	0.5	2.0
Compact	1,923	1.2	0.3	1.1	2.6
Intermediate	613	0.3	0.8	0.0	1.1
Full Size	82	0.0	0.0	1.2	1.2
Total	5,093	1.1	0.2	0.8	2.1

f. Shoulder Belt Misuse by Vehicle Manufacturer

Driver shoulder belt misuse by vehicle manufacturer for all model years, based on data from the Vindicator program for those drivers observed utilizing shoulder belts, is shown in Table 40. Drivers of Ford and Volkswagen products experienced the highest misuse rates among the domestic and import manufacturers, respectively.

Table 40. Driver shoulder belt misuse by vehicle manufacturer for all model years.

Vehicle Manufacturer	Base	Percent Misused			Total Percent Misused
		Under Arm	Behind Back	Loose	
AMC	122	1.6	0.0	0.0	1.6
Chrysler	774	2.2	0.3	0.6	3.1
Ford	1,838	1.9	0.6	1.8	4.3
GM	4,697	1.7	0.6	1.2	3.5
VW	462	2.4	0.6	0.0	3.0
Toyota	1,151	1.7	0.4	0.1	2.2
Datsun/Nissan	714	0.6	0.1	0.1	0.8
Honda	762	1.1	0.0	0.1	1.2
Other Imports	1,352	1.1	0.1	0.1	1.3
Total	11,872	1.6	0.5	0.8	2.9

When only recent model year vehicles (1984-1987) were included in the data summaries, Volkswagen showed the highest shoulder belt misuse rate for import manufacturers, while the three largest domestic manufacturers showed similar rates (Table 41).

Table 41. Driver shoulder belt misuse by vehicle manufacturer for 1984-1987 model years.

Vehicle Manufacturer	Base	Percent Misused			Total Percent Misused
		Under Arm	Behind Back	Loose	
AMC	48	0.0	0.0	0.0	0.0
Chrysler	354	1.7	0.0	1.1	2.8
Ford	799	1.0	0.1	1.5	2.6
GM	2,019	1.2	0.3	1.1	2.6
VW	88	2.3	1.1	0.0	3.4
Toyota	496	1.2	0.4	0.0	1.6
Datsun/Nissan	281	0.4	0.0	0.4	0.8
Honda	338	0.3	0.0	0.0	0.3
Other Imports	670	1.2	0.0	0.1	1.3
Total	5,093	1.1	0.2	0.8	2.1

Tables 42 and 43 illustrate driver shoulder belt misuse rates by manufacturer's division for all model years and newer model years (1984-1987), respectively. Table 42 shows that the Cadillac division of General Motors and the Plymouth division of Chrysler Corporation experienced the highest misuse rates when all model years were included. These divisions also experienced the highest misuse rates when only newer model years (1984-1987) were considered (Table 43). However, most divisions experienced lower misuse rates for newer vehicles.

3. Passenger Study Findings

A total of 106,930 passengers were observed in 78,710 vehicles during 1986. 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 quarter year for 1984 and by half year for 1985 and 1986 in Figure 4. The 1986 percentages contained in Figure 4 were obtained for all age categories (with each observation receiving equal weight) from the bi-annual

Table 42. Driver shoulder belt misuse by manufacturer's division for all model years.

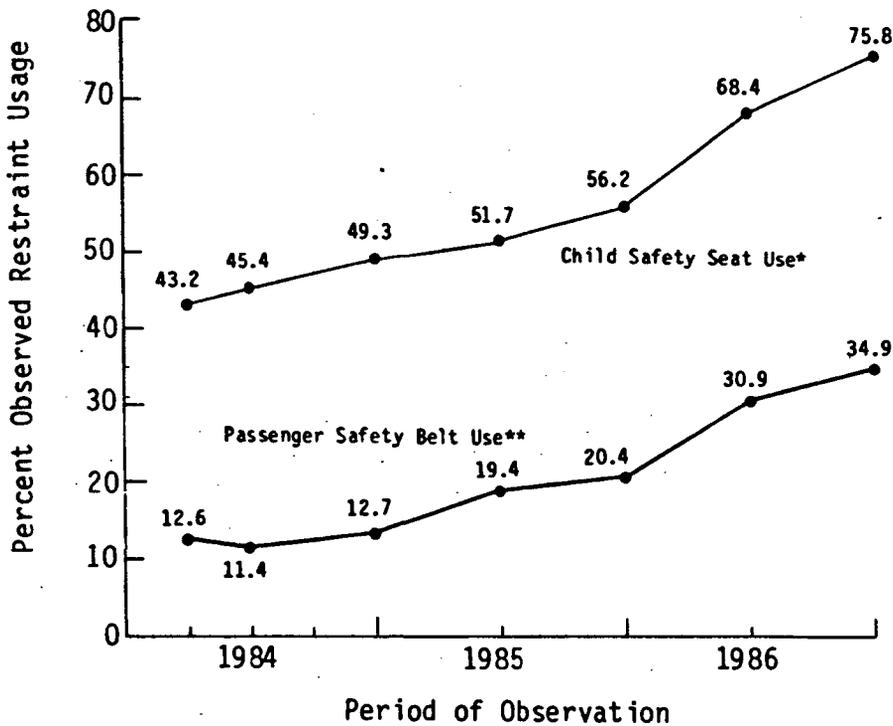
Manufacturer's Division	Base	Percent Misused			Total Percent Misused
		Under Arm	Behind Back	Loose	
● Chrysler					
Chrysler	188	1.1	0.0	1.1	2.2
Dodge	257	2.3	0.0	0.4	2.7
Plymouth	249	3.6	0.8	0.8	5.2
● Ford					
Ford	1,204	2.1	0.7	1.7	4.5
Lincoln	117	0.9	0.0	2.6	3.5
Mercury	365	1.9	0.5	2.7	5.1
● GM					
Buick	863	2.2	0.7	1.3	4.2
Cadillac	472	1.7	1.1	2.5	5.3
Chevrolet	1,620	1.4	0.6	0.9	2.9
Oldsmobile	1,029	2.0	0.8	1.2	4.0
Pontiac	504	1.2	0.4	0.8	2.4

Table 43. Driver shoulder belt misuse by manufacturer's division for 1984-1987 model years.

Manufacturer's Division	Base	Percent Misused			Total Percent Misused
		Under Arm	Behind Back	Loose	
● Chrysler					
Chrysler	105	1.9	0.0	1.9	3.8
Dodge	94	0.0	0.0	1.1	1.1
Plymouth	89	4.5	0.0	1.1	5.6
● Ford					
Ford	512	1.0	0.2	1.8	3.0
Lincoln	70	0.0	0.0	1.4	1.4
Mercury	149	1.3	0.0	1.3	2.6
● GM					
Buick	359	1.9	0.3	1.1	3.3
Cadillac	185	1.6	0.5	3.8	5.9
Chevrolet	650	0.6	0.5	0.8	1.9
Oldsmobile	484	1.0	0.2	0.6	1.8
Pontiac	238	1.3	0.0	1.3	2.6

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

summaries presented in Appendix D. The highest child safety seat usage rate, 75.8 percent was observed in the second half (July through December) of 1986, based on 5,423 observations. The second half child safety seat usage rate was 77.5 percent for infants (324 observations) and 75.7 percent for toddlers (5,099 observations). Passenger safety belt use in the second half of 1986 was observed to be 34.9 percent based on 47,616 observations of passengers over four years of age. It should be understood that mandatory safety belt laws were in effect in eight cities for both data collection periods in 1986 and were also in effect in another five cities during the second half of 1986. Therefore, the 19-city passenger safety belt use summaries presented in this chapter include data collected in numerous cities with mandatory safety belt laws.



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

Figure 4. Observed use of passenger restraint system over time.

Table 44 summarizes 1986 passenger restraint system use for the various age groups. Observed safety belt use for toddlers was 5.9 percent in 1986, compared to 9.3 percent in 1985. However, safety seat usage for toddlers was observed to be 72.3 percent in 1986, approximately 20 percent higher than in 1985 (52.6 percent).

Table 44. Passenger restraint system use (1986) by age group.

Age Group	Base	Safety Seat	Safety Belt	Total
Infant	723	70.0	1.7	71.7
Toddler	9,851	72.3	5.9	78.2
Subteen	15,294	1.7	28.5	30.2
Teen	14,461	N/A	19.1	19.1
Adult	66,601	N/A	36.9	36.9

The total passenger restraint use (safety seat and safety belt) by age group for the years 1984, 1985, and 1986 are presented in Table 45. 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 45. Passenger restraint use by age group and year.

Age Group	1984		1985		1986	
	Base	Percent	Base	Percent	Base	Percent
Infant	1,493	66.9	1,173	67.7	723	71.7
Toddler	16,873	51.7	11,615	61.9	9,851	78.2
Subteen	14,346	14.7	11,740	24.7	15,294	30.2
Teen	13,575	7.2	11,428	12.7	14,461	19.1
Adult	61,789	13.0	50,544	20.8	66,601	36.9

a. 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 723 infants were observed in the passenger study. Of this total, 70.0 percent were observed in approved safety seats, up from 66.4 percent in 1985. Of the 217 infants not observed in safety seats, unused safety seats were observed in 48 (22.1 percent) of the observations. In addition, 25.9 percent of all infants observed were held on passengers' laps. Unsafe (unapproved) seats were observed in 0.3 percent of the observations. Table 46 summarizes infant observations.

Table 46. Methods of restraining infants.

Type of Restraint	Number	Percent
Infant/Convertible Seat	506	70.0
Safety Belt	12	1.7
None or Unsafe Seats	205	28.4
On Lap	187	25.9
Unrestrained	16	2.2
Unsafe Seat	2	0.3
Total	723	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 47 shows infant safety seat usage by city. Overall 47.7 percent of all infants were observed to be correctly harnessed in an approved safety seat in 1986, as compared to 39.1 percent in 1985.

Table 47. Infant safety seat usage by city.

City	Base	Percent In Safety Seat	Percent Appears Correct
Baltimore	27	88.9	51.9
Seattle	33	84.8	69.7
Chicago	42	81.0	33.3
San Francisco	39	76.9	56.4
Pittsburgh	30	76.7	36.7
Minneapolis/St. Paul	56	75.0	32.1
San Diego	59	74.6	61.0
Atlanta	38	73.7	31.6
Boston	49	73.5	59.2
New York	43	72.1	67.4
Birmingham	32	71.9	65.6
Providence	45	71.1	64.4
Miami	26	65.4	46.2
Los Angeles	38	60.5	31.6
Dallas	30	60.0	53.3
Phoenix	33	57.6	39.4
New Orleans	32	56.3	25.0
Houston	43	51.2	39.5
Fargo/Moorhead	28	50.0	25.0
Total	723	70.0	47.7

Table 48 shows the characteristics of infants observed in safety seats. For the 506 infants observed in safety seats, 67.8 percent were observed to be correctly harnessed (and belted for infant-only seats) as compared to 58.9 percent in 1985. The harness was not used in 22.1 percent of the observations, while nonuse of the car belt was observed 9.1 percent of the time. In addition, 8.9 percent of the safety seats were observed forward facing. These findings support the conclusion that parents/guardians seem to understand the importance of securing the child seat or facing the seat rearward more so than using the harness. This was also found in the 1985 study, however, if referencing the 1985 study, those observations reported as not harnessed and those reported as not belted in table 34 (page 39) should be reversed.[4] Table 49 shows the correct usage of infants observed in safety seats by year (1984 through 1986).

Table 48. Characteristics of infants observed in safety seats.

Safety Seat Usage	Number	Percent
Correctly Used	343	67.8
No Harness	70	13.8
No Belt	4	0.8
No Harness or Belt	42	8.3
Forward Facing	45	8.9
Unsure	2	0.4
Total	506	100.0

Table 49. Correct safety seat usage by year for infants observed in safety seats.

Year	Percent Appears Correct
1984	57.0
1985	58.9
1986	67.8

Table 50 shows that infants were more commonly transported in the front seat, with the front seat outboard position being the most likely position. Table 50 also shows that an infant in the back seat was 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 1985.

Table 50. Safety seat usage for infants by seat position.

Seat Position	Base	Percent Observed in Safety Seat	Percent Appears Correct
Front Seat - Center	54	85.2	33.3
Front Seat - Outboard	405	61.7	47.9
Total Front Seat	459	64.5	46.2
Back Seat - Driver	90	75.6	51.1
Back Seat - Center	61	85.2	44.3
Back Seat - Outboard	104	84.6	54.8
Total Back Seat	255	81.6	51.0
Rear (for station wagons & hatchbacks)	9	22.2	11.1
Total	723	70.0	47.7

b. 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 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, shoulder/lap belt, or shield/belt system was properly used.

A total of 9,851 toddlers were observed during the passenger study. Of these, 7,126 (72.3 percent) were observed in either a toddler seat or booster seat. Of the 2,725 toddlers that were not in safety seats, unused safety seats were observed in 11.5 percent of the vehicles. Table 51 summarizes the toddler observations.

Table 51. Methods of restraining toddlers.

Type of Restraint	Number	Percent
Toddler Seat	6,652	67.5
Booster Seat	474	4.8
Safety Belt	584	5.9
None or Unsafe Seats	2,141	21.7
On Lap	919	9.3
Unrestrained	1,222	12.4
Unsafe Seats	0	--
Total	9,851	100.0

A comparison of the above findings with those of 1985 indicates an increase in the percentage of toddlers in safety seats. Safety seat usage increased from 52.6 to 72.3 percent.

Table 52 shows the type of restraint usage by toddlers and the percentage of usage by city. Overall, 64.1 percent of observed toddlers were harnessed and shielded (for seats requiring shields) in a child safety seat.

Table 52. 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	531	4.5	84.9	77.2	0.9	0.9	85.8
Boston	451	5.3	84.3	72.7	0.2	0.0	84.5
San Diego	765	7.1	75.2	73.1	6.1	4.4	81.3
Seattle	653	5.8	75.3	72.9	4.7	1.5	80.0
Providence	395	2.5	79.7	71.9	0.0	- -	79.7
Miami	424	1.7	75.9	68.9	3.1	1.4	79.0
San Francisco	768	6.1	73.8	71.2	2.9	2.2	76.7
Birmingham	561	1.8	70.2	66.7	0.7	0.2	70.9
Phoenix	505	3.2	68.1	66.9	2.4	0.6	70.5
Minneapolis/St.Paul	513	10.3	60.6	50.7	9.0	4.9	69.6
Houston	577	8.5	66.4	64.3	2.9	1.9	69.3
New York	551	6.7	68.6	62.6	0.2	0.0	68.8
Dallas	593	6.4	61.6	60.4	6.2	4.4	67.8
Pittsburgh	424	8.0	59.0	52.1	8.7	2.4	67.7
Los Angeles	454	7.5	57.0	46.7	8.4	3.3	65.4
Chicago	497	8.5	53.3	43.5	11.7	7.8	65.0
New Orleans	444	5.6	55.4	44.8	7.4	3.2	62.8
Atlanta	384	7.8	52.6	40.4	8.9	3.9	61.5
Fargo/Moorhead	361	3.3	42.4	33.2	10.5	4.2	52.9
Total	9,851	5.9	67.5	61.6	4.8	2.5	72.3

Table 53 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 91.2 percent in 1986 for toddlers observed in toddler safety seats. Table 54, which presents harness/shield use by year, shows an increase in correct usage by approximately 10 percent over 1985.

Table 53. Characteristics of toddlers observed in toddler safety seats.

Toddler Seat Usage	Number	Percent
Harness/Shield	6,065	91.2
No Harness or Shield	539	8.1
Unsure	48	0.7
Total	6,652	100.0

Table 54. Correct toddler seat usage by year for toddlers observed in toddler seats.

Year	Base	Percent Harness/Shield
1984	7,060	78.0
1985	5,741	81.3
1983	6,652	91.2

Table 55 summarizes the observations of toddlers in booster seats. Of the 474 toddlers observed in booster seats, 51.9 percent were recorded as correct. This compares to 39.3 percent in 1985. Much of this increase can be attributed to the increasing number of booster safety seats requiring shields and their corresponding high correct usage rate. Of the 152 booster safety seats requiring shields, 149 (98.0 percent) were correctly used, while only 97 of the 317 booster seats not requiring a shield were correctly used (30.6 percent).

Table 55. Characteristics of toddlers observed in booster seats.

Booster Seat Usage	Number	Percent
Correctly Used	246	51.9
Harness/Lap Belt	29	6.1
Shoulder/Lap Belt	68	14.3
Shield/Belt	149	31.4
Lap Belt Only	172	36.3
No Harness/Belt	48	10.1
No Shield/Belt	3	0.6
Unsure	5	1.1
Total	474	100.0

The relationship between seating position and safety belt/seat use is summarized in Table 56 (see page 54). Toddlers were observed transported in the back seat in three-quarters of the 9,851 observations. As was the case for infants, toddlers in safety seats are more likely to be observed in the back seat than in the front; 79.2 percent in back compared to 31.0 percent in the front seat. Similarly, correct usage was higher for toddlers positioned in the back seat. This phenomenon was also reported in 1985.

c. Subteens (Ages 5 to 12 Years)

A total of 15,294 subteens were observed in the 19 cities during the passenger study. Use of the booster seats were observed in approximately 1.7 percent of the cases. Safety belt use for this age group was found to be 28.5 percent. This compares to 23.3 percent in 1985. Table 57 shows safety belt usage by city for the subteen age group.

Table 57. Passenger safety belt usage by city for subteens.

City	Base	Percent Restrained
Boston	341	44.6
Minneapolis/St. Paul	1,001	36.9
New York	445	35.7
Dallas	1,058	35.3
San Diego	827	34.1
Los Angeles	855	32.3
Baltimore	591	32.2
Seattle	900	30.2
Houston	1,131	29.8
Pittsburgh	821	29.5
San Francisco	1,010	29.2
New Orleans	974	28.1
Providence	321	27.7
Chicago	857	26.6
Miami	460	26.3
Atlanta	703	25.3
Phoenix	1,012	18.2
Fargo/Moorhead	789	17.6
Birmingham	1,198	16.4
Total	15,294	28.5

Table 56. 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	468	8.8	26.3	20.7	3.8	0.6	30.1
Front Seat - Outboard	1,871	12.5	32.2	28.9	5.9	4.1	38.1
Total Front Seat	2,339	11.8	31.0	27.2	5.5	3.4	36.5
Back Seat - Driver	2,453	5.3	79.8	73.5	5.7	2.9	85.5
Back Seat - Center	1,980	2.6	76.1	69.1	3.0	1.2	79.1
Back Seat - Outboard	3,002	4.0	80.7	74.0	4.7	2.2	85.4
Total Back Seat	7,435	4.1	79.2	72.5	4.6	2.2	83.8
Rear (i.e., station wagons* and hatchbacks)	77	6.5	49.4	46.8	9.1	5.2	58.5
Total	9,851	5.9	67.5	61.6	4.8	2.5	72.3

*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 58 shows subteen safety belt usage by seating position. The current study indicates that the majority of subteens were observed in back seat positions. The 1985 study reported the same finding. However, the highest usage rate was experienced in the front-outboard position. The usage rate for this position was observed to be 50.6 percent in 1986 compared to 34.9 percent in 1985, an increase of over 15 percent. No other seat position varied more than one percent between 1985 and 1986.

Table 58. Passenger safety belt usage for subteens by seat position.

Seat Position	Base	Percent Restrained
Front Seat - Center	760	6.4
Front Seat - Outboard	5,229	50.6
Total Front Seat	5,989	45.0
Back Seat - Driver	3,305	23.3
Back Seat - Center	2,136	6.2
Back Seat - Outboard	3,442	21.5
Total Back Seat	8,883	18.5
Rear (i.e., station wagons & hatchbacks)	422	4.7
Total	15,294	28.5

d. Teens (Ages 13 to 19 Years)

Teens, with the exclusion of children 4 years of age and younger, were observed to have the lowest safety belt usage. Of a total of 14,461 teens, only 19.1 percent were observed using safety belts. However, in 1985 only 12.7 percent of 11,428 teens were observed using safety belts. Table 59 shows teen safety belt usage by city for each of the 19 cities. The percentage of use ranged from a high of 33.9 percent in Dallas to a low of 7.1 percent in Fargo/Moorhead.

Safety belt use by seating position (Table 60) indicates that teens in front seat positions were over five 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-outboard position. Safety belt usage for teens in the front-outboard position increased from 17.3 percent in 1985 to 29.1 percent in 1986. This was the only position to show a substantial increase.

Table 59. Passenger safety belt usage for teens by city.

City	Base	Percent Restrained
Dallas	657	33.9
San Diego	702	30.8
San Francisco	588	28.1
Houston	631	26.9
Minneapolis/St. Paul	1,649	25.5
Baltimore	396	25.0
Seattle	693	24.0
Los Angeles	891	21.3
Chicago	803	21.2
Boston	284	17.6
Miami	746	15.7
New York	481	15.6
Pittsburgh	1,090	15.0
Atlanta	1,058	14.7
New Orleans	919	14.7
Phoenix	572	12.2
Birmingham	595	9.2
Providence	515	7.6
Fargo/Moorhead	1,191	7.1
Total	14,461	19.1

Table 60. Passenger safety belt usage for teens by seat position.

Seat Position	Base	Percent Restrained
Front Seat - Center	516	1.0
Front Seat - Outboard	8,478	29.1
Total Front Seat	8,994	27.4
Back Seat - Driver	1,909	7.5
Back Seat - Center	708	2.3
Back Seat - Outboard	2,771	4.9
Total Back Seat	5,388	5.5
Rear (i.e., station wagon & hatchbacks)	79	1.3
Total	14,461	19.1

e. Adults (20 Years and Older)

Adult passengers were observed wearing safety belts in 36.9 percent of 66,601 observations. This compares with 20.8 percent for the 1985 study. Table 61 shows the number of observations and percent safety belt usage for each of the 19 cities. The highest safety belt usage was observed in Houston (57.7 percent) and the lowest was observed in Fargo/Moorhead (14.0 percent).

Table 61. Passenger safety belt usage for adults by city.

City	Base	Percent Restrained
Houston	4,619	57.7
Dallas	4,467	56.8
Baltimore	3,555	51.1
San Diego	4,247	50.4
San Francisco	4,195	47.0
Seattle	4,321	42.3
Boston	3,125	41.7
Minneapolis/St. Paul	2,920	37.5
Los Angeles	2,856	35.5
New York	2,855	34.4
Chicago	3,019	31.1
Miami	3,206	28.8
Phoenix	4,476	28.4
New Orleans	2,641	26.8
Pittsburgh	3,398	24.0
Birmingham	4,114	23.7
Atlanta	3,033	23.4
Providence	2,874	16.9
Fargo/Moorhead	2,680	14.0
Total	66,601	36.9

Adults observed in the front seat were observed to use safety belts in 40.9 percent of the observations while only 3.5 percent safety belt usage was observed for back seat adult passengers (Table 62). The front-outboard position was the only position to show a significant increase in safety belt usage for adults (as was the case for subteens and teens). Adult safety belt usage in this position was observed to be 41.4 percent in 1986 compared to 23.1 percent in 1985.

Table 62. Passenger safety belt usage for adults by seat position.

Seat Position	Base	Percent Restrained
Front Seat - Center	750	2.3
Front Seat - Outboard	58,659	41.4
Total Front Seat	59,409	40.9
Back Seat - Driver	2,319	4.5
Back Seat - Center	531	0.6
Back Seat - Outboard	4,305	3.3
Total Back Seat	7,155	3.5
Rear (i.e., station wagons and hatchbacks)	37	0.0
Total	66,601	36.9

f. Overall Safety Belt Usage by Seat Position

Overall safety belt usage by seat position is shown in table 63. The number of observations (base) and percent restrained for the driver and front-outboard positions were taken directly from Tables 1 and 2, respectively. The number of observations for the remaining positions were also obtained from the driver study (Table 20) and the corresponding percent restrained calculated by weighting these number of observations with observed safety belt use recorded in the passenger study for each age category. As shown in Table 63, total front seat safety belt usage was 35.4 percent while total back seat safety belt usage was 9.0 percent.

4. Study of Child Safety Seat Installation

Passenger study observations were made from curb locations near the exit points of selected shopping malls. Due to the limited amount of observation time available for each vehicle, the assessment of several aspects of child safety seats are difficult or impossible to obtain. For example, difficulty is encountered in observing safety seat manufacturer, and correct vehicle safety belt tether use during the passenger study. 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). The child safety seat study was designed to provide information on safety seat installation that could not be obtained as part of the passenger study.

Table 63. Overall safety belt usage by seat position.

Seat Position	First Half		Second Half		Total	
	Base	Percent Restrained	Base	Percent Restrained	Base	Percent Restrained
Front Seat - Driver	50,813	34.2	51,084	39.2	101,897	36.7
Front Seat - Center	202	2.0	294	5.2	496	3.8
Front Seat - Outboard	10,749	27.3	12,096	32.8	22,845	30.2
Total Front Seat	61,764	32.9	63,474	37.8	125,238	35.4
Back Seat - Driver	584	10.6	1,134	12.2	1,718	11.6
Back Seat - Center	233	4.1	440	4.8	673	4.6
Back Seat - Outboard	966	7.7	1,494	8.8	2,460	8.3
Total Back Seat	1,783	8.2	3,068	9.5	4,851	9.0
Total	63,547	32.2	66,542	36.5	130,089	34.4

During this study, 3,746 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 64. Of the 169 seats observed in an infant mode (rearward facing), 102 (60.4 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 STROLEE seat. STROLEE was also the most frequently observed seat in the toddler mode, while CENTURY seats were the most frequently observed booster seats. Overall, STROLEE safety seats were observed most often (28.1 percent).

Table 64. Types of child safety seats installed (percentage of safety seat observations by mode is shown parenthetically).

Name/ Manufacturer	Observed Mode			All Safety Seats
	Infant	Toddler	Booster	
Infant Love Seat	38(22.5)	N/A	N/A	38(1.0)
Dyn-O-Mite	53(31.4)	N/A	N/A	53(1.4)
Other Infant Seat	11(6.5)	N/A	N/A	11(0.3)
Bobby-Mac	3(1.8)	50(1.5)	12(8.8)	65(1.7)
Century	10(5.9)	794(23.1)	48(35.0)	852(22.7)
Collier-Keyworth	4(2.4)	145(4.2)	15(10.9)	164(4.4)
Cosco	0(0.0)	192(5.6)	27(19.7)	219(5.8)
Fisher Price	5(3.0)	78(2.3)	0(0.0)	83(2.2)
Kolcraft	0(0.0)	38(1.1)	26(19.0)	64(1.7)
Questor (Kantwet)	17(10.0)	985(28.6)	0(0.0)	1,002(26.8)
Strolee	26(15.4)	1,026(29.8)	1(0.7)	1,053(28.1)
Teddytot (Astroseat)	2(1.2)	132(3.8)	8(5.8)	142(3.8)
Total	169(100.0)	3,440(100.0)	137(100.0)	3,746(100.0)

Table 65 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 (28.4 percent).

Table 65. Types of toddler safety seats installed by model.

Manufacturer/Model	Base	Percent of Total
Bobby-Mac	50	1.5
Deluxe II	18	0.5
Champion	30	0.9
Other	2	0.1
Century	794	23.1
100	113	3.3
200	345	10.0
300	274	8.0
400 XL	21	0.6
Child Love	39	1.1
Other	2	0.1
Collier-Keyworth	145	4.2
Safe & Sound	143	4.1
Roundtripper	2	0.1
Cosco	192	5.6
Commuter	17	0.5
Safe-T-Seat	10	0.3
Safe-T-Shield	35	1.0
Safe & Snug	105	3.0
Safe & Easy	19	0.6
Other	6	0.2
Fisher Price	78	2.3
Car Seat	78	2.3
Kolcraft	38	1.1
Hi-Rider	20	0.6
Redi-Rider	15	0.4
Quick Step	3	0.1
Questor	985	28.6
Kantwet One Step	977	28.4
Kantwet Care Seat	8	0.2
Strolee	1,026	29.8
500 Series	308	8.9
600 Series	718	20.9
Teddy Tot	132	3.8
Astroseat	132	3.8
Total	3,440	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 3,440 toddler seats, 3,094 (89.9 percent) of the belt only and 346 (10.1 percent) of the belt and tether systems were observed, as shown in Table 66. This table also shows that safety seats that secure by the safety belt only were observed to be correctly installed 83.3 percent of the time, whereas, those that require a tether were much less likely to be installed correctly (i.e., 4.6 percent). Overall, 75.4 percent of the toddler seats observed were properly secured.

Table 66. 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	3,094	83.3
Secured by Tether and Car Safety Belt	346	4.6
Total	3,440	75.4

Figure 5 shows the percentage of belt-only and belt and tether type toddler seats observed since 1984. 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 a 28.4 percent difference between the two types of seats has increased to 79.8 percent in 1986. Figure 6 shows that the 83.3 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 car belt routing stickers on many of the newer seats.

The installation characteristics of the 3,094 toddler seats observed in 1986, that require securing with safety belts only, are shown in Figure 7. In 83.3 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 1.7 percent of the observations and improperly used 15.0 percent of the time. Table 67 shows installation characteristics by manufacturer for toddler seats that require securing by only the vehicle safety belt.

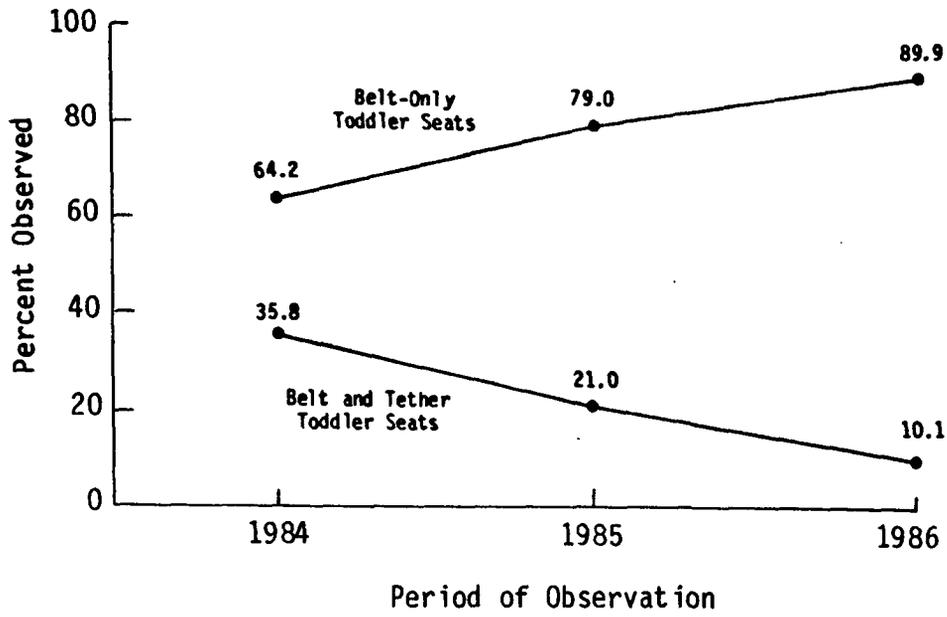


Figure 5. Percent of toddler safety seats observed over time by type of system.

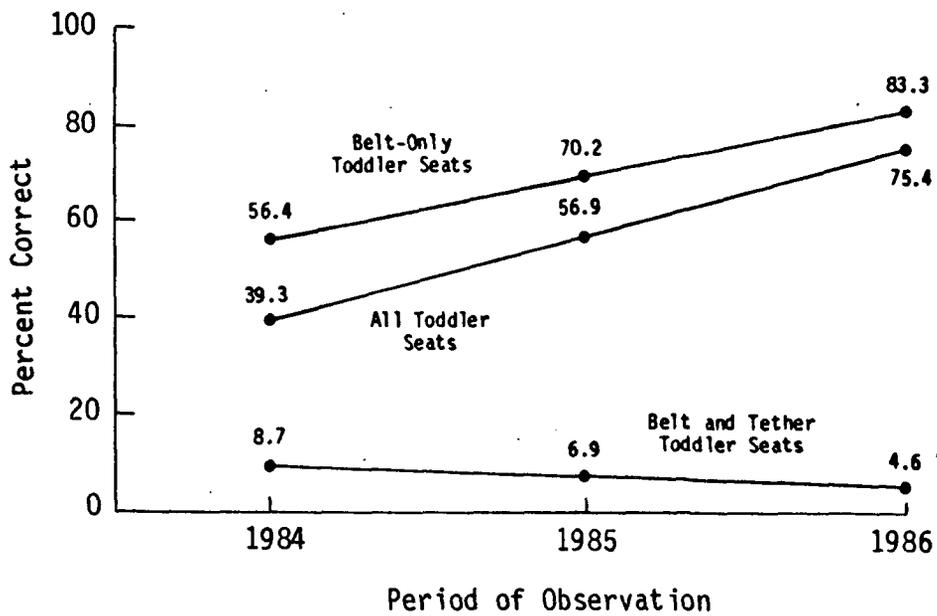


Figure 6. Correct installation of toddler safety seats over time by type of system.

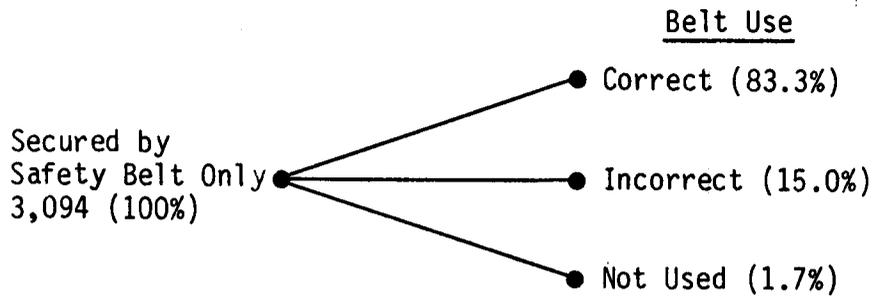


Figure 7. Installation characteristics of toddler seats that require securing by the safety belt only.

Table 67. 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	50	90.0*	2.0	8.0
Century	759	79.7*	1.5	18.8
Collier-Keyworth	145	95.2	2.1	2.7
Cosco	192	88.5	1.6	9.9
Fisher Price	78	97.4	1.3	1.3
Kolcraft	38	81.6	10.5	7.9
Questor (Kantwet)	985	80.8	1.6	17.6
Strolee	715	85.5	1.5	13.0
Teddytot (Astroseat)	132	79.6	3.0	17.4
Total	3,094	83.3	1.7	15.0

* 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 8 illustrates the correct/incorrect installation characteristics for the 346 toddler seats observed that require securing by the safety belt and tether. This figure shows that only 4.6 percent of the seats observed were properly tethered and belted. Failure to tether the seat was the most prominent type of misuse observed (93.3 percent). However, a tether was used incorrectly in only 0.6 percent of the observations. The most frequently observed multiple misuse was not using the

tether and incorrectly belting the seat to the vehicle (39.9 percent). This table also shows that only 4.3 percent of the toddler seats were not belted (by summing the "Not Used" percentages in the belt use column) and in 41.4 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 68 shows installation characteristics by manufacturer for toddler seats that require securing by the safety belt and tether strap.

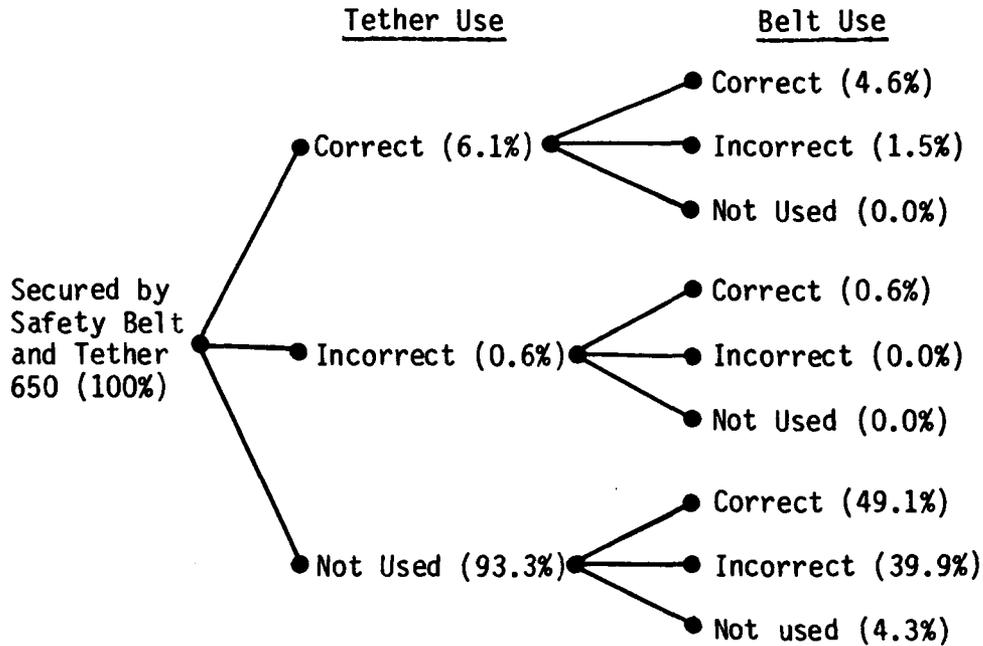


Figure 8. Installation characteristics of toddler seats that require securing by the safety belt and tether.

Table 68. 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 In-correctly	Percent Belt Not Used	Percent Car Belt Used In-correctly
Century (Child Love)	35	5.7	94.3	0.0	2.9	0.0
Strolee	311	4.5	93.2	0.6	4.5	46.0
Total	346	4.6	93.3	0.6	4.3	41.4

5. Helmet Study Findings

During the period January to December, 1986, 10,147 observations were made of helmet use by operators and passengers of motorcycles and mopeds. Table 69 shows helmet usage rates in each city for drivers and passengers of motorcycles. Of 8,604 motorcycle drivers, 59.8 percent were observed wearing helmets compared to 47.7 percent of the 905 passengers.

Table 69. Helmet use for motorcycle operators and passengers.

City	Driver Base	Percent Helmet On	Passenger Base	Percent Helmet On
Boston	167	99.4	7	100.0
Providence	276	27.2	29	100.0
New York	159	98.1	23	100.0
Baltimore	148	54.7	13	53.8
Pittsburgh	210	100.0	22	100.0
Chicago	350	22.0	49	12.2
Minneapolis/St. Paul	439	38.5	45	31.1
Fargo/Moorhead	395	38.0	52	26.9
Miami	322	98.8	44	100.0
Atlanta	200	100.0	14	100.0
Birmingham	562	100.0	65	100.0
New Orleans	351	99.4	44	97.7
Seattle	580	73.3	38	50.0
San Francisco	735	56.2	74	32.4
San Diego	794	49.2	60	23.3
Los Angeles	907	43.7	104	21.2
Phoenix	1,011	48.6	109	25.7
Houston	455	45.9	63	34.9
Dallas	543	56.7	50	30.0
Total	8,604	59.8	905	47.7

Driver and passenger helmet usage rates by year (1984 through 1986) are shown in Figure 9. This figure shows that driver and passenger helmet usage is decreasing over time.

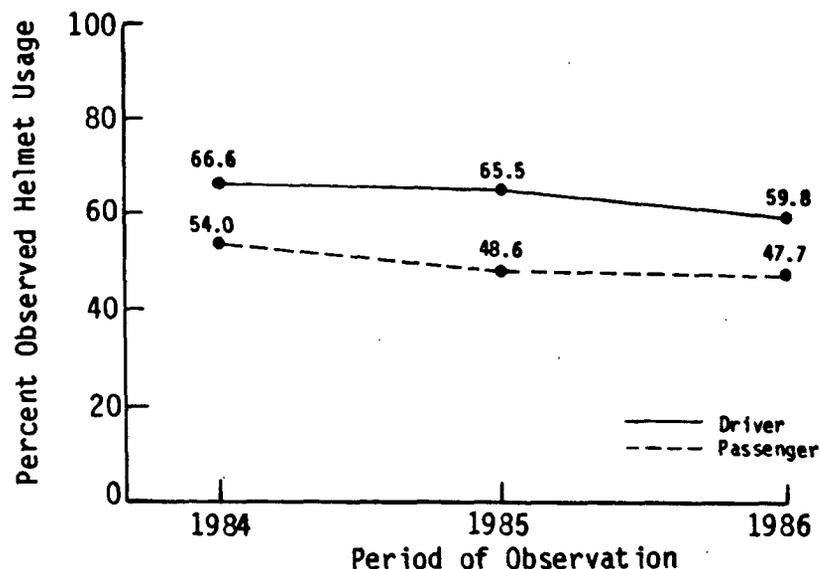


Figure 9. Motorcycle helmet use trends for operators and passengers.

Table 70 shows helmet usage rates in each city for drivers and passengers of mopeds (motorized bicycles). Comparing the results of this table (38.6 percent for drivers and 25.0 percent for passengers) to Table 69 reveals that, overall, drivers and passengers of mopeds were less likely to be wearing helmets than their counterparts on motorcycles.

Table 70. Helmet use for moped operators and passengers.

City	Driver Base	Percent Helmet On	Passenger Base	Percent Helmet On
Boston	7	14.3	1	0.0
Providence	13	0.0	0	--
New York	1	100.0	1	100.0
Baltimore	7	57.1	0	--
Pittsburgh	1	0.0	0	--
Chicago	4	0.0	3	0.0
Minneapolis/St. Paul	9	0.0	1	0.0
Fargo/Moorhead	2	0.0	0	--
Miami	3	0.0	0	--
Atlanta	0	--	0	--
Birmingham	33	100.0	4	100.0
New Orleans	13	92.3	2	100.0
Seattle	43	53.5	2	0.0
San Francisco	123	35.8	14	14.3
San Diego	146	38.4	6	16.7
Los Angeles	33	33.3	1	0.0
Phoenix	91	24.2	12	16.7
Houston	28	25.0	4	25.0
Dallas	29	41.4	1	0.0
Total	586	38.6	52	25.0

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 71 shows the seven cities in which mandatory helmet laws exist. Helmet use for both drivers and passengers were recorded to be 99.5 percent. Table 72 lists the twelve cities with no or limited laws. Driver and passenger helmet use rates for these cities were observed to be 48.0 and 31.2 percent, respectively.

Table 71. Motorcycle helmet use in cities with mandatory helmet use laws.

City	Driver Base	Percent Helmet On	Passenger Base	Percent Helmet On
Boston	167	99.4	7	100.0
New York	159	98.1	23	100.0
Pittsburgh	210	100.0	22	100.0
Miami	322	98.8	44	100.0
Atlanta	200	100.0	14	100.0
Birmingham	562	100.0	65	100.0
New Orleans	351	99.4	44	97.7
Total	1,971	99.5	219	99.5

Table 72. Motorcycle helmet use in cities with no or limited helmet use laws.

City	Driver Base	Helmet On	Passenger Base	Helmet On
Providence	276	27.2	29	100.0
Baltimore	148	54.7	13	53.8
Chicago	350	22.0	49	12.2
Minneapolis/St. Paul	439	38.5	45	31.1
Fargo/Moorhead	395	38.0	52	26.9
Seattle	580	73.3	38	50.0
San Francisco	735	56.2	74	32.4
San Diego	794	49.2	60	23.3
Los Angeles	907	43.7	104	21.2
Phoenix	1,011	48.6	109	25.7
Houston	455	45.9	63	34.9
Dallas	543	56.7	50	30.0
Total	6,633	48.0	686	31.2

Figure 10 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 slight decline in helmet use among drivers and passengers in cities with no or limited helmet use laws, while helmet use in those cities with mandatory laws remains constant.

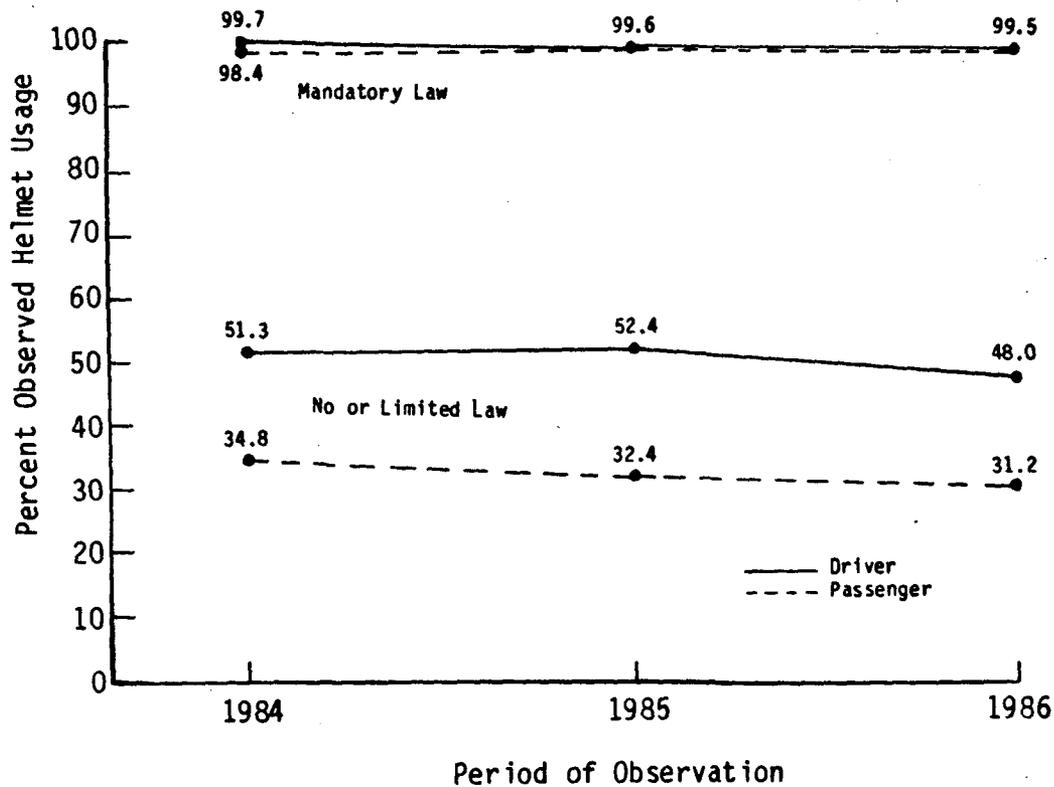


Figure 10. Motorcycle helmet use trends for operators and passengers by the existence of mandatory helmet use laws.

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4. Goryl, M.E., "Restraint System Usage in the Traffic Population: 1985 Annual Report," DTNH22-84-C-07264, National Highway Traffic Safety Administration, May, 1986.
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APPENDIX A - DRIVER SAFETY BELT USAGE BY MANUFACTURER'S DIVISION AND
MODEL YEAR (1978-1987)

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

<u>Model Year</u>	<u>Base</u>	<u>Percent Belted</u>
1978	29	24.1
1979	31	12.9
1980	40	27.5
1981	37	21.6
1982	26	26.9
1983	8	25.0
1984	4	0.0
1985	6	50.0
1986/87	<u>1</u>	<u>0.0</u>
Total	182	23.1

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

<u>Model Year</u>	<u>Base</u>	<u>Percent Belted</u>
1978	11	36.4
1979	10	30.0
1980	12	33.3
1981	7	14.3
1982	4	25.0
1983	15	33.3
1984	31	38.7
1985	58	36.2
1986/87	<u>29</u>	<u>55.2</u>
Total	177	37.9

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

<u>Model Year</u>	<u>Base</u>	<u>Percent Belted</u>
1978	64	26.6
1979	43	41.9
1980	57	22.8
1981	72	30.6
1982	53	39.6
1983	49	34.7
1984	92	35.9
1985	105	35.2
1986/87	<u>39</u>	<u>48.7</u>
Total	574	34.3

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

<u>Model Year</u>	<u>Base</u>	<u>Percent Belted</u>
1978	61	19.7
1979	72	22.2
1980	49	14.3
1981	70	37.1
1982	58	29.3
1983	95	42.1
1984	115	29.6
1985	131	35.1
1986/87	<u>39</u>	<u>35.9</u>
Total	690	30.7

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

<u>Model Year</u>	<u>Base</u>	<u>Percent Belted</u>
1978	47	23.4
1979	43	20.9
1980	23	39.1
1981	10	30.0
1982	55	27.3
1983	79	31.7
1984	100	35.0
1985	118	42.4
1986/87	<u>53</u>	<u>37.7</u>
Total	528	33.5

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

<u>Model Year</u>	<u>Base</u>	<u>Percent Belted</u>
1978	171	24.0
1979	178	21.4
1980	204	25.0
1981	235	38.7
1982	259	39.4
1983	276	42.8
1984	357	40.6
1985	372	39.8
1986/87	<u>125</u>	<u>52.8</u>
Total	2,177	36.8

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

<u>Model Year</u>	<u>Base</u>	<u>Percent Belted</u>
1978	475	16.4
1979	500	21.6
1980	464	25.0
1981	438	34.3
1982	337	38.9
1983	393	41.5
1984	652	41.9
1985	607	46.1
1986/87	<u>290</u>	<u>33.5</u>
Total	4,156	33.6

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

<u>Model Year</u>	<u>Base</u>	<u>Percent Belted</u>
1978	128	31.3
1979	152	17.8
1980	93	26.9
1981	108	32.4
1982	104	48.1
1983	136	36.8
1984	168	39.3
1985	185	51.4
1986/87	<u>70</u>	<u>34.3</u>
Total	1,144	36.0

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

<u>Model Year</u>	<u>Base</u>	<u>Percent Belted</u>
1978	215	17.2
1979	296	18.9
1980	237	24.9
1981	242	38.4
1982	249	39.4
1983	306	41.8
1984	462	44.8
1985	412	47.1
1986/87	<u>188</u>	<u>44.2</u>
Total	2,607	36.6

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

<u>Model Year</u>	<u>Base</u>	<u>Percent Belted</u>
1978	146	13.0
1979	166	22.9
1980	126	22.2
1981	121	30.6
1982	147	47.6
1983	116	29.3
1984	241	34.4
1985	254	40.6
1986/87	<u>137</u>	<u>38.0</u>
Total	1,454	31.9

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

<u>Model Year</u>	<u>Base</u>	<u>Percent Belted</u>
1978	349	22.9
1979	354	23.7
1980	222	28.8
1981	237	30.4
1982	290	34.8
1983	287	41.5
1984	532	38.5
1985	550	39.1
1986/87	<u>216</u>	<u>42.6</u>
Total	3,037	34.0

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

<u>Model Year</u>	<u>Base</u>	<u>Percent Belted</u>
1978	94	21.3
1979	115	29.6
1980	53	35.9
1981	87	36.8
1982	72	43.1
1983	86	43.0
1984	174	36.8
1985	176	39.2
1986/87	<u>56</u>	<u>28.6</u>
Total	913	35.3

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

<u>Model Year</u>	<u>Base</u>	<u>Percent Belted</u>
1978	37	5.4
1979	35	22.9
1980	13	7.7
1981	23	21.7
1982	19	36.8
1983	45	37.8
1984	68	42.7
1985	68	42.7
1986/87	<u>38</u>	<u>31.6</u>
Total	346	31.8

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

<u>Model Year</u>	<u>Base</u>	<u>Percent Belted</u>
1978	64	50.0
1979	94	53.2
1980	91	53.9
1981	86	66.3
1982	56	55.4
1983	38	42.1
1984	67	50.8
1985	77	55.8
1986/87	<u>20</u>	<u>55.0</u>
Total	593	54.5

Table A.15. Driver safety belt usage for Toyota by model year.

<u>Model Year</u>	<u>Base</u>	<u>Percent Belted</u>
1978	124	41.1
1979	152	36.8
1980	210	39.5
1981	234	52.6
1982	218	55.5
1983	260	55.8
1984	332	58.1
1985	348	60.6
1986/87	<u>154</u>	<u>59.7</u>
Total	2,032	52.9

Table A.16. Driver safety belt usage for Datsun/Nissan by model year.

<u>Model Year</u>	<u>Base</u>	<u>Percent Belted</u>
1978	92	30.4
1979	129	31.0
1980	158	32.3
1981	146	41.8
1982	171	46.8
1983	199	51.3
1984	240	45.8
1985	238	52.1
1986/87	<u>111</u>	<u>42.3</u>
Total	1,484	43.3

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

<u>Model Year</u>	<u>Base</u>	<u>Percent Belted</u>
1978	75	46.7
1979	99	48.5
1980	111	48.7
1981	130	53.9
1982	148	53.4
1983	168	63.7
1984	243	55.1
1985	254	58.3
1986/87	<u>110</u>	<u>50.9</u>
Total	1,338	54.6

Table A.18. Driver safety belt usage for other imports by model year.

<u>Model Year</u>	<u>Base</u>	<u>Percent Belted</u>
1978	104	43.3
1979	138	40.6
1980	148	45.3
1981	221	48.4
1982	282	47.2
1983	359	49.0
1984	537	48.8
1985	566	52.7
1986/87	<u>208</u>	<u>52.9</u>
Total	2,563	48.9

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 1978-1987 model years by car series for each manufacturer. Only those models that have 20 or more observations are presented.

<u>Manufacturer/Series</u>	<u>Base</u>	<u>Percent Belted</u>
<u>American Motors</u>		
Concord	108	23.1
Eagle	40	22.5
Spirit	27	25.9
<u>Jeep</u>		
Cherokee	75	41.3
CJ-7	33	51.5
Wagoneer	61	27.9
<u>Plymouth</u>		
Caravelle	23	26.1
Horizon	211	34.6
Reliant	232	39.2
Volare	88	23.9
<u>Dodge</u>		
Aries	213	38.5
Aspen	69	14.5
Daytona	28	39.3
Diplomat	52	13.5
Omni	189	31.2
400	25	44.0
600	68	29.4
<u>Chrysler</u>		
Cordoba	34	32.4
Laser	31	35.5
LeBaron	247	37.2
New Yorker	186	28.5

<u>Manufacturer/Series</u>	<u>Base</u>	<u>Percent Belted</u>
<u>Buick</u>		
Century	433	39.0
Electra	241	36.9
Le Sabre	307	36.2
Regal	594	34.2
Riviera	101	36.6
Skyhawk	137	38.7
Skylark	317	38.2
Somerset	31	35.1
<u>Chevrolet</u>		
Camaro	409	35.9
Caprice	523	29.4
Cavalier	523	45.3
Celebrity	475	43.6
Chevette (Regular)	503	33.2
Citation	356	35.4
Corvette	58	19.0
El Camino	22	18.2
Impala	243	24.7
Malibu	419	28.6
Monte Carlo	402	25.9
Monza	63	17.5
Nova	113	23.9
Spectrum	22	45.5
Sprint	25	44.0

<u>Manufacturer/Series</u>	<u>Base</u>	<u>Percent Belted</u>
<u>Cadillac</u>		
Brougham	156	29.5
Cimarron	33	54.6
Deville	571	36.1
Eldorado	206	37.9
Fleetwood	27	48.1
Seville	151	33.8
<u>Oldsmobile</u>		
Calais	79	45.6
Custom Cruiser	58	37.9
Cutlass	1,139	31.8
Delta 88	467	38.1
Firenza	67	55.2
Ninety-Eight	253	34.8
Omega	117	35.0
Toronado	74	33.8
Ciera	348	47.7
<u>Pontiac</u>		
Bonneville	173	29.5
Fiero	61	42.6
Firebird	231	29.4
Grand Am	79	43.0
Grand Prix	240	21.3
Grand Le Mans	31	16.1
J 2000/2000	164	41.5
Le Mans	45	28.9
Parisienne	49	22.4
Phoenix	76	26.3
Sunbird	53	26.4
T 1000/1000	50	28.0
6000	188	45.2

<u>Manufacturer/Series</u>	<u>Base</u>	<u>Percent Belted</u>
<u>Ford</u>		
Escort	617	35.8
EXP	42	33.3
Fairmont	355	35.2
Fiesta	49	26.5
Ford Wagon	32	34.4
Granada	169	26.6
LTD	541	35.5
LTD II	27	3.7
Mustang	454	33.7
Pinto	73	24.7
Tempo	289	39.4
Thunderbird	355	32.1
<u>Mercury</u>		
Capri	64	45.3
Cougar	211	28.4
Lynx	102	39.2
Marquis	307	34.9
Monarch	40	27.5
Topaz	64	37.5
Zephyr	91	41.8
<u>Lincoln</u>		
Continental	238	33.2
Mark Series	102	30.4

Foreign Models

Audi	174	42.5
BMW	201	52.2
Datsun/Nissan	1,484	43.3
Honda	1,338	54.6
Jaguar	57	38.6
Mazda	552	46.7
Mercedes Benz	201	39.8
Mitsubishi	298	49.7
Opel/Isuzu	39	51.3
Peugeot	56	46.4
Porsche	49	40.8
Renault	154	44.8
Saab	63	66.7
Subaru	285	44.9
Toyota	2,032	52.9
Volkswagen Rabbit	340	55.0
Volkswagen Other	253	53.8
Volvo	405	63.7

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 which best describes the road condition at the time of observation.
10. Start Time: Specify the hour and minutes, and circle AM or PM for the start of the collection period.
11. End Time: Specify the hour and minutes, and circle AM or PM for the ending of the collection period.

DRIVER RESTRAINT OBSERVATION: FORM #1

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

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

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

Figure 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 four 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. If drivers in cars with one-piece harness and belt systems are wearing the shoulder harness under the arm or too loose you must still record Code 1 in this column.

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 have the harness behind the back. This is not the proper way to wear the harness, and if it is in this position, 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. Driver Safety Belt Misuse: There are three possible misuse categories, all pertaining to the shoulder harness. These misuse categories are:

Under Arm (Code 1)

This means that the shoulder harness is under the left arm of the driver instead of over the left shoulder.

Behind Back (Code 2)

This means that the shoulder harness is entirely behind the back of the driver. Make sure that belt use is also recorded as Code 2 since only the lap belt is being used.

Loose (Code 3)

The distance between the shoulder belt and the driver's chest should not be much more than the width of a normal fist, as a general rule. If the shoulder belt is excessively loose or falling off the shoulder, record as Code 3.

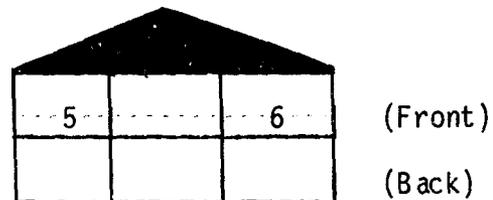
7. Automatic Restraint System: The automatic safety belt systems will be found mainly in newer Volkswagon Rabbits and Jettas, Chevrolet Chevettes, and Toyota Cressidas. When observing these three makes, you will have to determine whether the belt system is an "automatic" system (Code 1) or a regular 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 and always has been standard equipment in the Toyota Cressida. This vehicle also is equipped with a separate lap belt which has to be manually fastened. Automatic safety belts are also found 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.

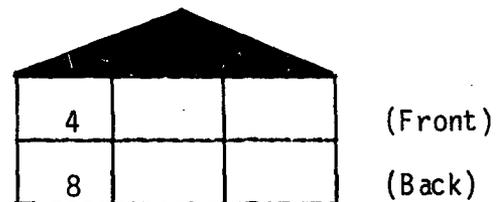
8. Driver and Passenger Position by Age Group: Record the age group code shown at bottom of the form in one of the six seat position boxes on the observation form. The six boxes are intended to illustrate the six seat positions of the passenger car with the driver side on the left, and the outboard on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

Examples:

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



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



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

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

9. 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. as specified on your schedule.

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.

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. 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 an unsafe 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 child. All models have provisions for securing the safety seat to the car through auto safety belts. Some models have a tether strap which is to be attached to the rear safety belt or deck lid to prevent pivoting (tipping forward). Also consult the list of NHTSA approved toddler safety seats provided to you. Again, you are not responsible for identifying the exact type of safety seat in this particular study, but you should be aware of the models that have tether straps and shields.

Booster Seats (Code 5)

Boosters are strong, firm seats which usually have no back. Booster seats designed for use in a vehicle have a device to secure an auto lap belt. Many seats 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. Many newer models utilize a shield which must be secured to the car with the vehicle safety belt.

Unsafe Seat (Flimsy Seat) (Code 6)

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

None (Code 7)

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

Child on Lap (Code 8)

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

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

Infant Seat

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

Harness/Car Belt (Code 1)

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

Harness Only (Code 2)

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

Car Belt Only (Code 3)

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

No Harness/Car Belt (Code 4)

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

Facing Wrong Direction (Code 7)

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

Unsure (Code 8)

If you can not make a position verification on the use of the safety seat, use code 8.

Unused Seat (Code 9)

If there is an infant in the vehicle not using a safety seat and the car also contains an unused infant-only seat, use a code 9.

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 seat to the car. Therefore, the only possible toddler seat codes are 1, 4, 7, 8 and 9.

Harness/Shield (Code 1)

Use this code if any child (infant, toddler or subteen) 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 child (infant, toddler or subteen) is in an approved toddler safety seat, but is not restrained by the harness or shield.

Wrong Direction/Other (Code 7)

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 8)

If you can not make a positive verification on the use of the harness system or shield, use Code 8.

Unused Seat (Code 9)

If there is a child in the vehicle not using a safety seat and the car also contains an unused toddler seat, use a Code 9.

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 4.

Shield/Belt (Code 3)

Use this code if the child is observed in an approved "shield" type booster seat secured by the auto safety belt. Most of these seats require the auto belt be secured over the shield.

Lap Belt Only (Code 4)

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 5)

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.

No Shield/Car Belt (Code 6)

Use this code if the child is in an approved "shield" type booster seat with either the auto belt unsecure or the shield not in the proper position.

Other/Unsafe (Code 7)

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

Unsure (Code 8)

If you can not make a positive verification on the use of the safety device, use Code 8.

Unused Seat (Code 9)

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 7 or 8 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 out-board position. If a seat is located in the rear of a station wagon or a hatchback, do not code in the position.
3. Tether: (Code for Toddler Seats Only), write in the code describing the tether requirement and its use. The codes are as follows:

SPECIAL STUDY - CHILD SAFETY SEATS: FORM A

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

No.	Seat	Position	Tether	Belting Attached to Seat	Shield Required	Infant, Toddler or Booster Model/Comments
	1 Front 2 Back 3 Rear	1 Driver side 2 Center 3 Outboard	1 Tether required properly used 2 Tether required improperly used 3 Tether required but not used 4 Tether not required	1 Proper 2 Improper 3 No 4 Not required	1 Yes 2 No	
1.						
2.						
3.						
4.						
5.						
6.						
7.						
8.						
9.						
10.						
11.						
12.						
13.						
14.						
15.						
16.						
17.						
18.						
19.						
20.						

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 safety seat to the vehicle seat. The codes are as follows:

Proper (Code 1)

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

No (Code 3)

This means that a safety seat has been positively identified as one that requires the vehicles belt system to be attached to the undercarriage or through the molded plastic frame but that the belting is not used, i.e., the safety 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 belt 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 Champion and Deluxe II, Century (GM) Child Love Seat and Infant Love Seat.

5. **Shield Required:** (Code for Toddler or Booster Seats) Write in the code to describe whether or not a shield is required for proper use of the safety seat. Code a 1 for yes or a 2 for no. Refer to the manual for illustrations of the safety 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 II 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, infant or booster seat. The model names can be found in your manual along with the illustrations of the seats. You may be able to read the name directly off the seat. Be sure to indicate if the seat is a toddler, infant or booster 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 II seat, do not simply write down "Bobby Mac", but also include the model description (Deluxe II) or model code number (i.e., Strolee 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.			
13.			
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20.			
21.			
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, 1986

	<u>Base</u>	<u>Percent</u>
Total (19 Cities)	399	63.7
Boston	25	80.0
Providence	29	69.0
New York	30	70.0
*Baltimore	9	77.8
Pittsburgh	11	54.5
Chicago	22	68.2
Minneapolis/St. Paul	32	59.4
Fargo/Moorhead	13	30.8
*Miami	13	69.2
Atlanta	15	60.0
Birmingham	19	73.7
*New Orleans	21	61.9
Seattle	22	86.4
*San Francisco	22	72.7
San Diego	30	66.7
Los Angeles	20	50.0
Phoenix	18	44.4
Houston	30	46.7
Dallas	18	55.6
Avg. Percent Per City		63.0

*Reported in June, 1986

PERCENT OF TODDLERS OBSERVED IN CHILD SAFETY SEATS

January - June, 1986

	<u>Base</u>	<u>Percent</u>
Total (19 Cities)	4,752	68.8
Boston	217	91.2
Providence	178	84.8
New York	270	64.1
*Baltimore	258	83.7
Pittsburgh	216	63.0
Chicago	258	64.3
Minneapolis/St. Paul	280	63.2
Fargo/Moorhead	145	51.7
*Miami	244	84.4
Atlanta	172	60.5
Birmingham	200	56.5
*New Orleans	237	56.5
Seattle	311	73.0
*San Francisco	400	76.0
San Diego	408	77.0
Los Angeles	255	58.4
Phoenix	189	57.7
Houston	221	59.7
Dallas	293	62.5
Avg. Percent Per City		67.8

*Reported in June, 1986

PERCENT OBSERVED SAFETY BELT USE BY PASSENGERS

January - June, 1986

	<u>Toddler</u>		<u>Sub-Teen</u>		<u>Teen</u>		<u>Adult</u>	
	<u>Base</u>	<u>Percent</u>	<u>Base</u>	<u>Percent</u>	<u>Base</u>	<u>Percent</u>	<u>Base</u>	<u>Percent</u>
Total (19 Cities)	4,752	7.4	6,937	28.0	6,884	16.1	34,919	34.3
Boston	217	4.1	90	53.3	46	30.4	1,522	48.6
Providence	178	1.7	81	19.8	236	7.6	1,326	16.3
New York	270	6.7	245	34.3	220	14.1	1,309	34.2
*Baltimore	258	5.8	97	50.5	110	18.2	1,626	44.6
Pittsburgh	216	11.1	399	29.6	629	13.7	1,795	21.1
Chicago	258	8.9	331	27.5	307	14.7	1,605	31.0
Minneapolis/St. Paul	280	10.7	386	31.3	760	18.4	1,555	27.8
Fargo/Moorhead	145	0.0	225	16.9	548	5.7	1,295	10.6
*Miami	244	1.2	95	27.4	160	11.9	1,588	26.3
Atlanta	172	10.5	320	25.9	568	12.3	1,595	20.0
Birmingham	200	1.0	647	10.0	293	4.8	2,341	15.7
*New Orleans	237	5.9	529	22.3	584	8.6	1,280	16.1
Seattle	311	9.3	503	29.4	415	21.2	2,349	37.2
*San Francisco	400	8.0	504	30.4	342	29.8	2,332	48.9
San Diego	408	10.5	401	35.2	373	27.6	2,388	49.6
Los Angeles	255	10.2	448	32.4	433	22.9	1,431	36.4
Phoenix	189	5.8	533	17.3	305	9.5	2,553	23.4
Houston	221	14.0	557	32.0	271	19.9	2,522	55.8
Dallas	293	7.2	546	41.8	284	32.4	2,507	55.4
Avg. Percent Per City		7.0		29.9		17.0		32.6

*Reported in June, 1986

PERCENT OF INFANTS OBSERVED IN CHILD SAFETY SEATS

July - December 1986

	<u>Base</u>	<u>Percent</u>
Total (19 Cities)	324	77.5
Boston	24	66.7
Providence	16	75.0
New York	13	76.9
Baltimore	18	94.4
Pittsburgh	19	89.5
Chicago	20	95.0
Minneapolis/St. Paul	24	95.8
Fargo/Moorhead	15	66.7
*Miami	13	61.5
Atlanta	23	78.3
Birmingham	13	69.2
New Orleans	11	45.5
Seattle	11	81.8
San Francisco	17	82.4
*San Diego	29	82.8
Los Angeles	18	72.2
Phoenix	15	73.3
Houston	13	61.5
Dallas	12	66.7
Avg. Percent Per City		75.5

*Reported in December 1986

PERCENT OF TODDLERS OBSERVED IN CHILD SAFETY SEATS

July - December 1986

	<u>Base</u>	<u>Percent</u>
Total (19 Cities)	5,099	75.7
Boston	234	78.2
Providence	217	75.6
New York	281	73.3
Baltimore	273	87.9
Pittsburgh	208	72.6
Chicago	239	65.7
Minneapolis/St. Paul	233	77.3
Fargo/Moorhead	216	53.7
*Miami	180	71.7
Atlanta	212	62.3
Birmingham	361	78.9
New Orleans	207	70.0
Seattle	342	86.5
San Francisco	368	77.4
*San Diego	357	86.3
Los Angeles	199	74.4
Phoenix	316	78.2
Houston	356	75.3
Dallas	300	73.0
Avg. Percent Per City		74.6

*Reported in December 1986

PERCENT OBSERVED SAFETY BELT USE BY PASSENGERS

July - December 1986

	<u>Toddler</u>		<u>Sub-Teen</u>		<u>Teen</u>		<u>Adult</u>	
	<u>Base</u>	<u>Percent</u>	<u>Base</u>	<u>Percent</u>	<u>Base</u>	<u>Percent</u>	<u>Base</u>	<u>Percent</u>
Total (19 Cities)	5,099	4.5	8,357	28.9	7,577	21.9	31,682	39.7
Boston	234	6.4	251	41.4	238	15.1	1,603	35.2
Providence	217	3.2	240	30.4	279	7.5	1,548	17.4
New York	281	6.8	200	37.5	261	16.9	1,546	34.5
Baltimore	273	3.3	494	28.7	286	27.6	1,929	56.5
Pittsburgh	208	4.8	422	29.4	461	16.9	1,603	27.3
Chicago	239	7.9	526	26.0	496	25.2	1,414	31.3
Minneapolis/St. Paul	233	9.9	615	40.5	889	31.4	1,365	48.5
Fargo/Moorhead	216	5.6	564	17.9	643	8.2	1,385	17.3
*Miami	180	2.2	365	26.0	586	16.7	1,618	31.3
Atlanta	212	5.7	383	24.8	490	17.3	1,438	27.3
Birmingham	361	2.2	551	24.0	302	13.6	1,773	34.3
New Orleans	207	5.3	445	35.1	335	25.4	1,361	36.9
Seattle	342	2.6	397	31.2	278	28.1	1,972	48.4
San Francisco	368	4.1	506	28.1	246	25.6	1,863	44.5
*San Diego	357	3.1	426	33.1	329	34.3	1,859	51.5
Los Angeles	199	4.0	407	32.2	458	19.9	1,425	34.7
Phoenix	316	1.6	479	19.4	267	15.4	1,923	35.0
Houston	356	5.1	574	27.7	360	32.2	2,097	60.1
Dallas	300	5.7	512	28.5	373	35.1	1,960	58.5
Avg. Percent Per City		4.7		29.6		21.7		38.4

*Reported in December 1986