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of Transportation

**National Highway
Traffic Safety
Administration**

Memorandum

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Subject: Final Report on Restraint System
Use in 19 U.S. Cities

Date: AUG 16 1991

From: George L. Parker
Associate Administrator for
Research and Development

Reply to
Attn. of:

To: Distribution

The Final Report on Restraint System Use in 19 U.S. Cities is attached for your review. This study continued to monitor the use of occupant restraint systems and motorcycle/moped helmet use in 19 U.S. cities during 1990. A total of 84,022 observations of automobile drivers indicated an overall driver safety belt use rate of 49.0 percent. The driver safety belt use rate in areas that have mandatory use laws was 61.8 percent for female drivers and 48.0 percent male drivers. Whereas in areas with no use laws, driver safety belt use rate was 42.8 percent for female drivers and 30.0 percent for male drivers.

Attachment

Distribution:

Associate Administrator for Plans and Policy
Associate Administrator for Rulemaking
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Chief Counsel

#

The 1990 report



RESTRAINT SYSTEM USE IN 19 U.S. CITIES

1990 ANNUAL REPORT

Contract Number

DTNH22-89-C-07034



Prepared For

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

Prepared By

Goodell-Grivas, Inc.
Southfield, Michigan

June 1991

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16. Abstract <p>This study continued to monitor the use of occupant restraint systems and motorcycle/moped helmet use in 19 U.S. cities during 1990. A total of 84,022 observations of automobile drivers indicated an overall driver safety belt use rate of 49.0 percent. The driver safety belt use rate in areas that have mandatory use laws was 61.8 percent for female drivers and 48.0 percent for male drivers. Whereas in areas with no use laws, driver safety belt use rate was 42.8 percent for female drivers and 30.0 percent for male drivers.</p> <p>The passenger observation indicated that 68.2 percent of the infants, 74.5 percent of the toddlers, 49.1 percent of the subteens, 26.0 percent of the teens and 43.7 percent of the adults were restrained. Child safety seats were observed being used for 82.6 percent of the infant and 84.7 percent of the toddler passengers. Correct toddler safety seat installation was recorded at a rate of 85.2 percent. In areas with motorcycle helmet use laws 96.4 percent of the operators and 94.4 percent of the passengers used helmets. Helmet use in areas with no helmet use laws was 37.0 percent for operators and 31.7 percent for passengers.</p> <p>Automobiles equipped with automatic belt systems had an overall driver belt use rate of 78.8 percent. The motorized shoulder belt system that could not be disconnected displayed the highest use rate of 97.2 percent. The lowest automatic system use rate of 64.9 percent was observed from the 3-point non-motorized system.</p>			
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SUMMARY

Five observational studies for various segments of the traffic population were conducted in 19 cities throughout the nation. Data obtained through daytime observations at approximately 30 roadway 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 use and misuse the shoulder belt system; (2) determine the use of seat belts and child safety seats by the passengers in automobiles; (3) determine the correctness of toddler safety seat installation; (4) identify the extent to which helmets are worn by operators and passengers of motorcycles and mopeds; and (5) determine the effectiveness of automatic seat belt systems in increasing shoulder belt use.

This report documents the procedures used to conduct the observational studies and the results of the data analysis for 1990.

Driver Observation Findings

This study was conducted for 2 quarters (1st and 3rd quarter) during the 1990 calendar year. The driver observation study captured the use and misuse of shoulder belts only, since most vehicles on the road today have a singular system combining lap and shoulder restraints and also to keep the study procedure the same as in previous years.

The following major findings, associated with driver shoulder belt use, are based on 84,022 observations of drivers stopped at traffic signals on major arterial streets and freeway exit ramp locations:

- Driver shoulder belt use increased to 49.0 percent in 1990 (Figure 1). The percent use of shoulder belt system for 1986 to 1988 were recalculated from the historical database to allow the comparison with 1989 and 1990 data.
- Female driver shoulder belt use was higher than male driver use (56.6 percent versus 43.6 percent).
- Driver shoulder belt use was found to be the highest among the 25-to 49 year age group and lowest among the under 20 age category (49.9 percent versus 43.7 percent).
- Drivers were observed to use shoulder belts more often on expressways than on primary roads (53.4 percent versus 47.4 percent).
- Drivers of imported vehicles were more apt to use shoulder belts than drivers of domestic vehicles (57.3 percent versus 45.0 percent).

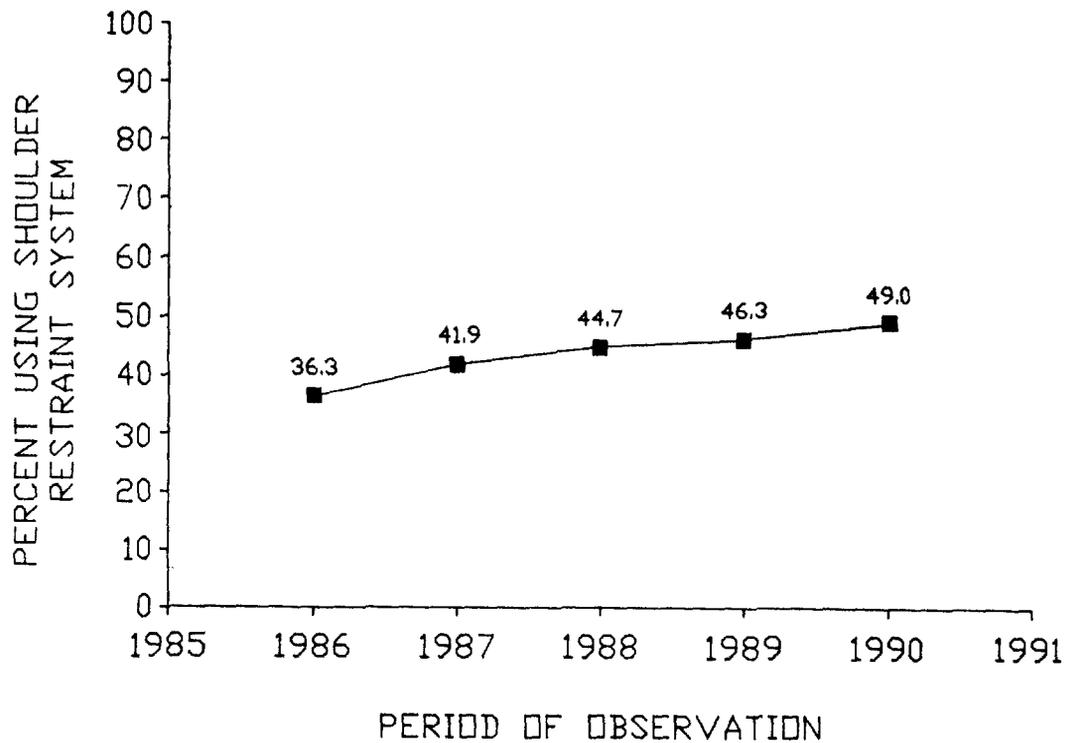


Figure 1. Driver shoulder belt use over the past five years.

The following major findings are based on shoulder belt misuse of the 84,022 driver observations in 1990.

- Approximately 2.0 percent of all drivers utilizing shoulder belts misuse them (i.e., were not properly restrained).
- Misuse of shoulder belts were higher among female drivers than male drivers (2.7 percent versus 1.5 percent).

Passenger (Infants, Toddlers and/or Subteens) Observation Findings

This study, conducted in the first and third quarters of 1990, consisted of determining safety belt use amongst passengers in qualifying vehicles. If a vehicle had an infant, toddler and/or subteen in that vehicle, then the entire vehicle excluding the driver was included in this study. If any vehicles were observed which did not carry any of the above categories of passenger, then those vehicles were not included in the observation for this study.

A total of 45,300 passengers were observed at shopping center entrances/exits during the 1990 passenger observation study. The following are the major findings:

- 84.4 percent of the infants and toddlers were observed to be restrained in child safety seats during 1990 (Figure 2).
- Subteens (5 to 12-year olds) were observed to be secured by safety seats or seat belts 51.2 percent of the time.

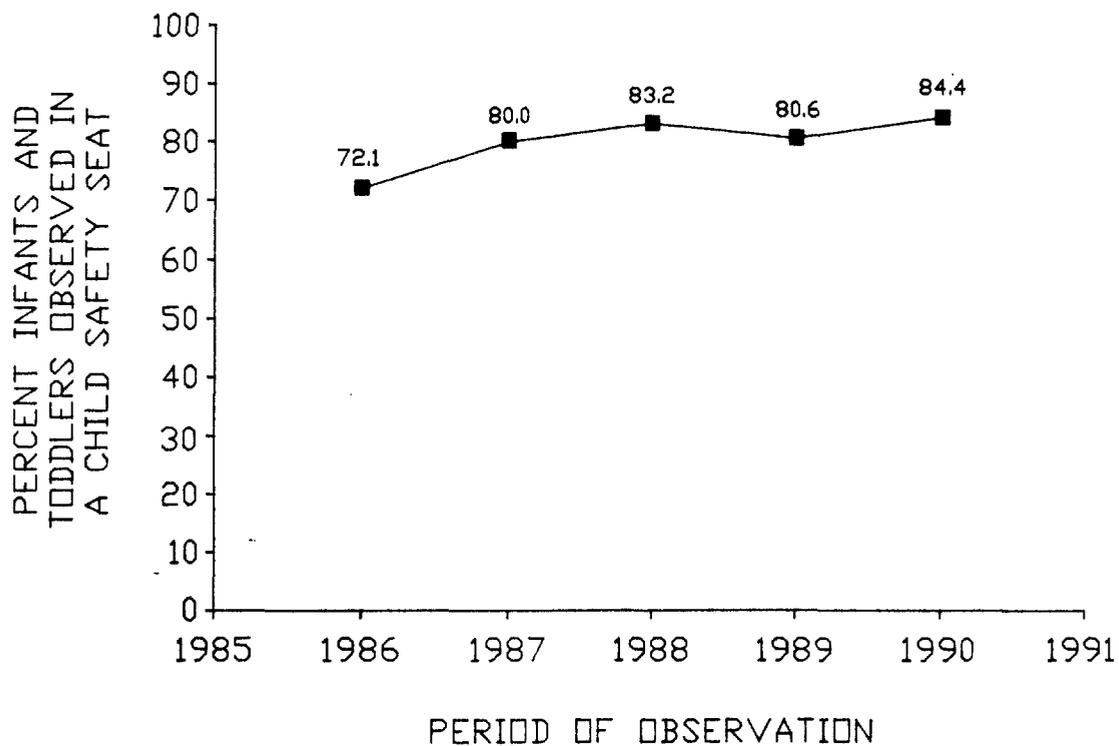


Figure 2. Infant and toddler safety seat use over time.

Toddler Safety Seat Installation

A total of 3,483 toddler safety seats were observed in parked vehicles at shopping malls as a part of this study. Of the 3,483 toddler seats observed, 3,389 required installation only by seat belt, the remaining 94 or 2.7 percent required installation by safety belt and a tether strap. The toddler seats, that required securing by seat belt, 87.4 percent were observed to be correctly installed, whereas, toddler seats requiring a tether strap were observed to be correctly installed only in 6.4 percent of the vehicles. Figure 3 displays correct toddler safety seat installation percentages for the past five years.

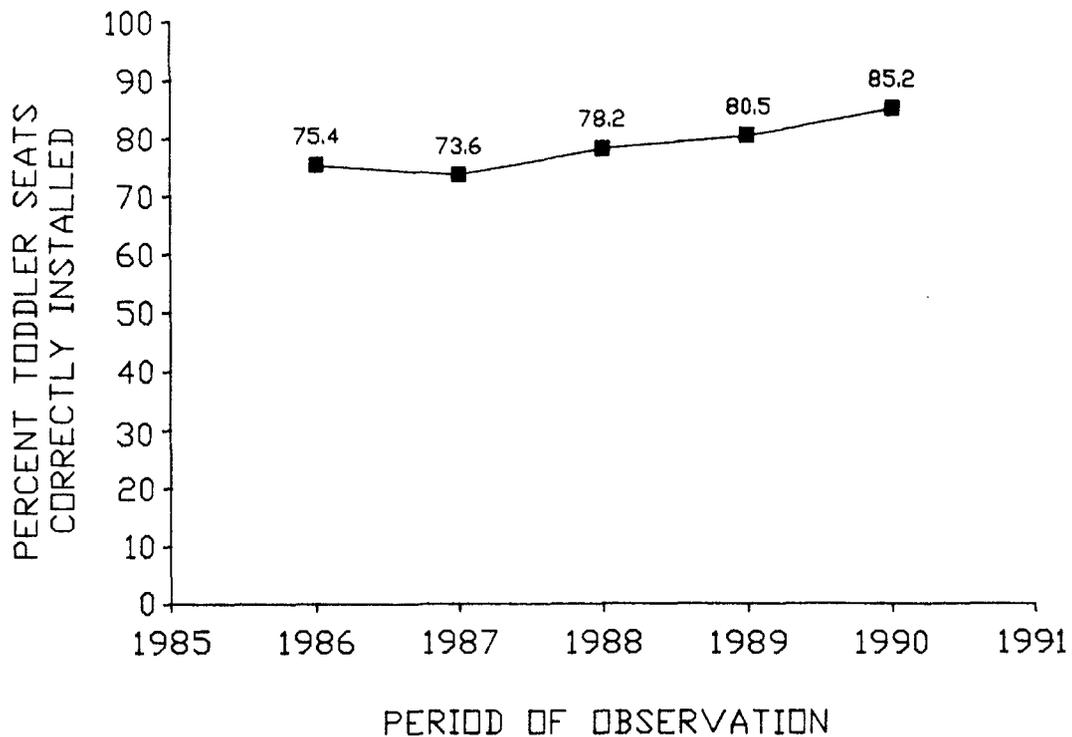


Figure 3. Correct toddler safety seat installation trend.

Motorcycle and Moped Helmet Study Findings

Motorcycle helmet use for operators and passengers were observed to be 59.8 percent and 54.7 percent, respectively, in 1990, based on 11,634 observations. In cities with a mandatory helmet use law, operator helmet use was observed to be 96.4 percent, whereas in cities with no or limited helmet use laws, only 37.0 percent were observed wearing a helmet. Figure 4 depicts the percent of operators wearing helmets over the past five years. Moped helmet use was based on 943 observations. Helmet use for mopeds was 43.9 percent for the operators and 30.4 percent for the passengers.

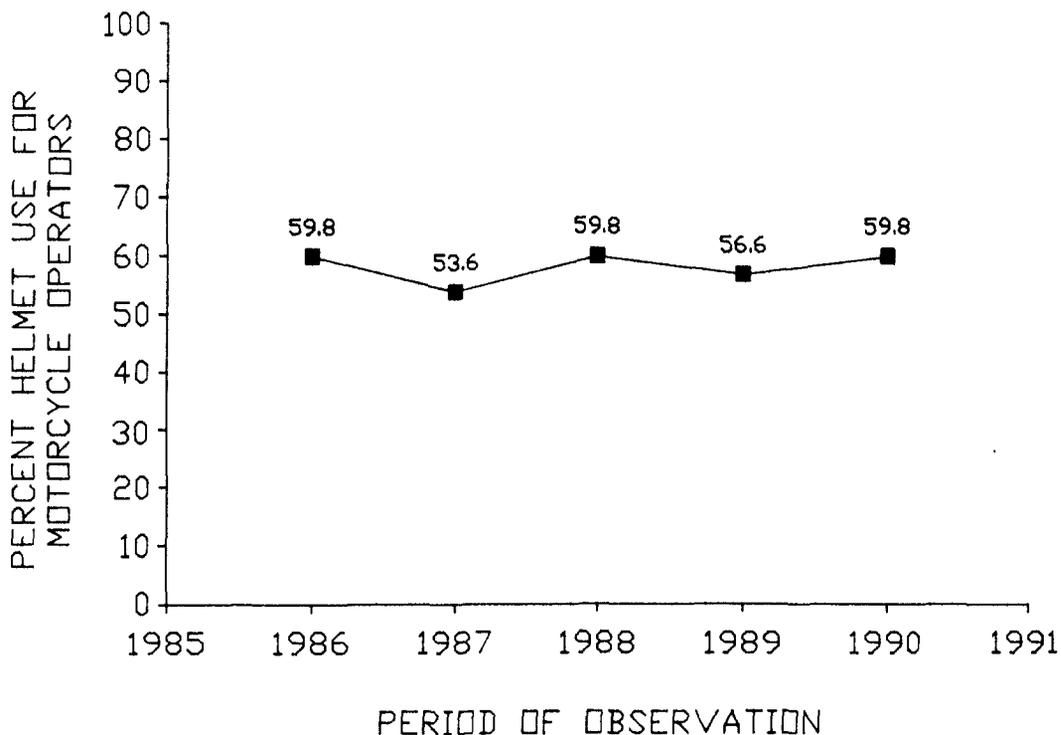


Figure 4. Motorcycle helmet use trend for operators.

Observations of Passive Restraint Systems

The 1990 study included 22,498 observations of vehicles with automatic safety belts. Analysis of automatic seat belt systems for the 1987 to 1991 model year vehicles indicated 77.7 percent of the drivers were restrained as opposed to 51.5 percent of the drivers for the same (1987 to 1991) model year vehicles without a passive restraint system. The use rates for motorized shoulder belt systems and non-motorized systems were 93.9 percent and 67.1 percent, respectively. Approximately 2.8 percent of the vehicles observed were equipped with air bag systems for driver side only or driver and passenger sides. Driver shoulder belt use was found to be 49.6 percent for vehicles equipped with airbags.

INTRODUCTION

This report documents the results of a project sponsored by the National Highway Traffic Safety Administration on restraint system and motorcycle helmet use. The results are based on field observations conducted in 19 cities across the nation. Included in the database are observations of drivers and passengers in excess of 100,000 passenger vehicles and helmet use for the operators and passengers on approximately 12,000 motorcycles and mopeds.

Project Objective

The objective of this study was to observe, record, analyze and report the use of occupant restraint systems in passenger vehicles and motorcycle/moped helmet use in the 19 U.S. cities.

Project Description

The project consisted of a data collection effort that has been divided into two separate studies. Study 1 consisted of collecting data on; a) driver and front-outboard passenger shoulder belt use and misuse; b) passenger safety belt use and child safety seat use; c) correct installation of toddler safety seats; and d) helmet use by operators and passengers of motorcycles and mopeds. Study 2 concentrated on obtaining driver and front-outboard passenger safety belt use from those vehicles that were equipped with automatic seat belt systems. Study 2 also obtained data on motorcycle and moped helmet use. Each study is described below.

Study 1

This study was conducted during the first and third quarters of 1990. This study consisted of four different elements of data collection, they are:

● Passenger Vehicle All Restraint Study

The purpose of this study was to monitor the use of shoulder belts by drivers and front-outboard passengers of privately-owned passenger vehicles at designated intersections and freeway exit locations in all 19 cities. The data collected for the vehicle, the driver and front-outboard passenger included:

- License plate number.
- Make/model of car.
- The presence of automatic safety belt system.
- Estimated age of driver and passenger(s).
- Gender of driver and passenger(s).
- Observed driver shoulder belt use.
- Observed driver shoulder belt misuse.
- Shoulder belt use of front-outboard passenger.

● Passenger Study

The purpose of this study was to monitor the use of occupant restraint systems by passengers of private passenger vehicles where a sub-teen or younger child was present. This data was collected at exits/entrances of selected shopping malls. The passenger observations were a component of study 1 only. 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 in reference to each passenger included:

- Estimated age.
- Seating position.
- Occupant restraint system use.
- Safety seat use characteristics for infants and toddlers.

● Toddler Safety Seat Installation Study

Observation of the characteristics of and proper/improper installation of toddler safety seats was another component of study 1. This part of data collection consisted of observing toddler safety seats in parked cars located in the same shopping centers as in passenger study to obtain detailed information on the installation of child safety seats. The data collected on toddler safety seat installation were:

- Type of toddler seat (metal tubular or molded plastic construction).
- Tether use (for toddler seats that require the use of tethers).
- Belt use (for toddler seats that require that the lap belt be attached to the undercarriage of the toddler seat).
- Identification of model of toddler seats.

● Motorcycle/Moped Helmet Use Study

The purpose of this study was to monitor the use of helmets by operators and passengers of motorcycles and mopeds observed on the roadways. Helmet use observations were also conducted as a part of study 1.

Study 2

This study was conducted during the second and fourth quarters of 1990, and it consisted of:

● Automatic Restraint Study

This study was conducted in order to monitor the use and misuse of shoulder belts by the driver in automobiles equipped with automatic restraint systems only. Location and information collected are identical to the passenger vehicle all restraint study with added emphasis on lap belt use.

● Motorcycle/Moped Helmet Use Study

The purpose of this study was the same as presented in study 1.

Study Methodology

This study is a continuation of a series of studies sponsored by the National Highway Traffic Safety Administration (NHTSA) which determines restraint system use trends in 19 U.S. cities. The major elements of the study methodology are described in the following sections.

Data Collection Sites

The cities, data collection sites and data collection procedures that were used in the previous projects were adopted for the current study. This served to provide a consistency of the results of the current and prior years' databases. Any changes in data collection sites necessitated by construction, or other uncontrollable events, were compensated by obtaining data in the same immediate area. The 19 cities selected for this study are from various geographical regions of this country and provide a variety of climate, demographic and driving conditions. They were purposely selected to provide a long-term, cost-effective trend data. They are also the same cities and sites within each city that have been utilized since 1974 for similar observations.

The cities and corresponding data collection regions are listed below and presented geographically in figure 5.

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

Data Collection Scenario

The sites used for data collection in the passenger vehicle all restraint study were primary road intersections and freeway exits. The

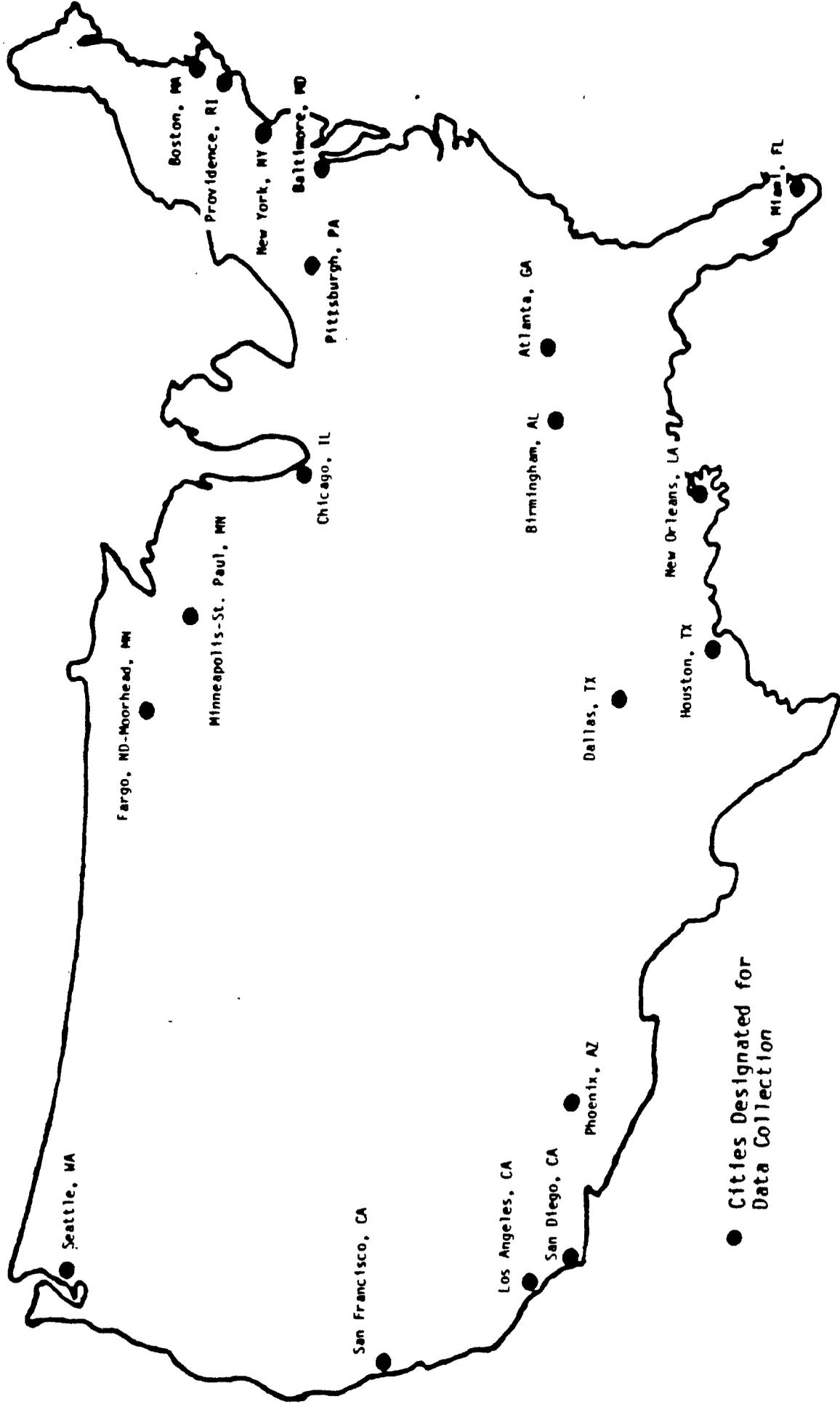


Figure 5. Location of the 19 cities for restraint use observation.

sites were selected to be representative of the land use and socio-economic composite of the city within self-imposed constraints. Site selections were originally made in an earlier study by a process that involved subdividing each city area (the corporate city, along with the contiguous suburban area) into a series of grids.[1] The grids were classified as being one of three groups: 1) grids in open country areas containing few or no primary road intersections; 2) grids containing one or more freeway exits; and 3) grids containing primary roads but no freeway exit.

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 initial trip to a 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, the observer inspected the next site on the list and repeated the process until an acceptable site was identified.

Study 1 and study 2 required 30 sites for the driver information studies (70 percent arterial and 30 percent freeway exit) within each city. In addition, study 1 required 3 passenger study locations (shopping malls) within each city. The malls for the passenger study were selected so as to provide a variety of socio-economic levels, sufficient traffic flow and good vantage points for conducting observations.

Study 1 required 12 days of data collection for each city, consisting of approximately 6 days for the all restraint study, 6 days for the passenger study, and 4 hours for the toddler seat installation study. Helmet study observations were recorded throughout the data collection period as motorcycle and moped observations were made. Study 2 required 11 days of driver observation with the observer recording motorcycle and moped data when they occurred in the traffic stream.

A typical observation day consisted of a minimum of six hours of data collection. The driver observations of study 1 required 1 hour at each of 6 sites per day. Passenger observations required 6 hours per day at a single shopping center during its hours of operation. The driver observation was usually conducted on Monday through Thursday and the passenger observation on Friday through Sunday. The observations for the automatic restraint study of study 2 required 2 hours at three sites per day.

Data Forms and Procedures

The data collection forms and instructions for their completion are provided in Appendix A.

Whenever possible, data collectors were deployed to predetermined sites at randomly selected time intervals, different from the previous visit to the city. Only privately-owned passenger cars, station wagons and mini vans with in-state license plates were eligible for the driver observation. Trucks, taxi cabs, and marked company-owned cars (i.e., those used for commercial purposes) were not sampled for this study.

The target observation at signalized intersections of study 1 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., any randomly selected vehicle behind the first car). However, if only one car stopped then that vehicle was observed. Any passenger vehicle that stopped at a stop sign controlled location was eligible for observation. The target observations for study 2 consisted of vehicles that were equipped with automatic restraint systems only. Observers were only responsible for observing the cars in the curb lane.

Passenger observation procedures required six hours per data collection day. Data was collected on Fridays, Saturdays and Sundays during the peak hours of traffic movement in and out of the shopping malls. This maximized the chance of obtaining observations on infants and toddlers. A total of six passenger observation days were conducted in each city for the passenger study in study 1.

Only non-commercial passenger cars, station wagons, and mini vans were eligible for the passenger study. The primary target observations were vehicles with infants and toddlers. Data collectors were positioned at curbside, at a stop sign or signal controlled exits from the shopping center with the greatest flow of traffic. Observers did not go on the roadway and were only responsible for observing the vehicles in the curb lane.

Procedures for observations of child safety seat installation required inspection of parked vehicles containing toddler seats in all of the shopping center parking lots. The observations were conducted for approximately two hours per week during the days scheduled for the passenger restraint observations. Data were obtained during peak pre-determined parking demand periods.

Helmet use observations by motorcycle/moped operator(s) and passenger were obtained as a "second priority" activity conducted during all other observations. Target vehicles consisted of any motorcycle, moped or motorized bike observed on the roadway or freeway during data collection periods. Observations regarding helmet use were recorded for both operators and passengers (as applicable).

Training Procedures

Training procedures were developed during the initial phases of the subject study and were approved by NHTSA prior to conducting training activities. All procedures were developed around those used in the previous studies (1988 and earlier) to maximize consistency in reference to

project efforts. Training included the study of an observer's manual, classroom instruction and field training. Prior to deployment, observers received 3 to 5 days of training either in Detroit or at field locations. Additional training of up to a week was conducted by the field supervisor in the region assigned to a particular observer. All observer training was conducted by the supervisor and/or senior staff members. Follow-up supervisory field visits were made randomly or when warranted. It is important to note that at least 2 out of 4 full-time field observers have been conducting this study for the past 4 to 5 years.

Quality Control

The supervisor was stationed in Detroit, Michigan and was responsible for scheduling observer activities, supervising data entry and conducting data collection quality control activities at field locations. Supervisory visits to each region were made on a routine basis or additionally when the supervisor believed such a visit was warranted. 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 identical vehicles for driver and passenger studies. Discrepancies were identified and discussed during an accuracy review.

At the end of each city visit, data forms were submitted by the observers for review and analysis. Data summaries were generated on a monthly basis and submitted to NHTSA along with requested additional information and analyses.

Analysis of 1990 Results

Goodell-Grivas, Inc. has been contracted by NHTSA (since 1983) to conduct observational studies for generation of an annual report documenting restraint system use in 19 U.S. cities. Data from the past four project years have been included in the 1990 report to facilitate comparison of results and identification of trends which may have been present in the 19 U.S. cities.

The 1990 data was obtained by conducting two studies in a two cycle series. The first study consisted of four unique observations as defined in the project description, the second consisted of one study (with the motorcycle helmet use study being duplicated). One collection cycle consisted of obtaining data in all 19 cities for the first study followed by a return to each city for data collection on study number 2. This cycle was then repeated as a part of this project.

The data collection methods for this year were identical during each cycle with site locations also identical as compared to the previous years. Procedurally, no changes were made to this year's program compared to the studies conducted in 1989.

Some tables and figures in this annual report have been completed with the use of a software package called "Vindicator". This program used the vehicle identification numbers obtained from the individual state's Department of Motor Vehicles tag interrogation process to provide details on the vehicles in question, such as: model year, wheel base, restraint system, and the existence of an airbag system if present.

Data summaries which refer to a "base" represent the total number of observations. The "percent restrained" number represents the use rate recorded for a particular 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.

SUMMARY OF THE PASSENGER VEHICLE ALL RESTRAINT STUDY

Driver and Front-Outboard Passenger Shoulder Belt Use by City

Driver and front-outboard passenger shoulder belt use rates for 1990 are presented in Table 1. In addition to the use rate being stratified by city, it is also divided into cities that have a mandatory safety belt use law (MUL) and those cities which do not (non-MUL). During the 1990 survey period, 14 out of 19 cities surveyed had MUL's and are designated as such with an asterisk after their names. As shown in Table 1, cities with MUL's have a much higher shoulder belt use than non-MUL cities.

Driver shoulder belt use rates for 1990 ranged from a high of 66.1 percent in Dallas to a low of 26.7 percent in Providence, with an overall shoulder belt use rate for drivers of 49.0 percent. Front-outboard passenger (not including infants and toddlers) use rates ranged from a high of 68.6 percent in Dallas to a low of 17.1 percent in Providence, with an overall shoulder belt use rate for front-outboard passengers of 43.9 percent.

Table 1. Driver and passenger shoulder belt use.

City	Driver Shoulder Belt Use		Passenger Shoulder Belt Use	
	Base	Percent Restrained	Base	Percent Restrained
Atlanta*	4,238	46.6	898	33.2
Baltimore*	4,758	58.4	881	59.0
Birmingham	4,188	31.7	1,028	26.6
Boston	4,677	32.6	959	29.4
Chicago*	4,409	39.7	830	32.2
Dallas*	4,302	66.1	981	68.6
Fargo/Moorhead	3,497	37.0	815	31.8
Houston*	4,737	63.0	1,060	61.9
Los Angeles*	4,403	55.6	1,025	46.0
Miami*	4,270	48.6	979	38.4
Minneapolis/St. Paul*	4,858	59.2	972	58.4
New Orleans*	5,014	44.4	1,137	39.7
New York*	3,859	38.9	1,060	34.1
Phoenix	4,917	49.0	1,062	44.4
Pittsburgh*	4,245	45.0	956	37.1
Providence	4,366	26.7	829	17.1
San Diego*	4,520	62.4	1,112	54.9
San Francisco*	4,275	61.6	939	60.5
Seattle*	4,489	59.1	903	53.2
MUL Cities	62,377	53.7	13,733	48.5
Non-MUL Cities	21,645	35.7	4,693	30.4
Total	84,022	49.0	18,426	43.9

* Mandatory safety belt use law (MUL) in effect.

Driver Shoulder Belt Use by Age and Sex

Observed driver shoulder belt use, stratified by driver sex and age, is presented in Tables 2 and 3. Female shoulder belt use rates continued to be higher than their male counterparts. A total of 56.6 percent of female drivers utilized shoulder belts as compared to 43.6 percent of male drivers.

The shoulder belt use summary tables are also subdivided by age groups. The female age group of 20-24 years displayed the highest seat belt use rate among all groups at 58.0 percent. The seat belt use rate for males was highest in the 25-49 year age group at 44.8 percent.

Table 2. Female driver - shoulder belt use by age.

Age	MUL Cities		Non-MUL Cities		Total	
	Base	Percent Restrained	Base	Percent Restrained	Base	Percent Restrained
Under 20	168	60.7	88	40.9	256	53.9
20 - 24	3,909	63.1	1,492	44.4	5,401	58.0
25 - 49	16,874	61.8	6,341	43.2	23,215	56.7
50 or Older	4,608	60.9	1,710	39.9	6,318	55.2
Total	25,559	61.8	9,631	42.8	35,190	56.6

Table 3. Male driver - shoulder belt use by age.

Age	MUL Cities		Non-MUL Cities		Total	
	Base	Percent Restrained	Base	Percent Restrained	Base	Percent Restrained
Under 20	185	42.2	117	23.9	302	35.1
20 - 24	3,438	42.6	1,330	23.5	4,768	37.2
25 - 49	23,893	49.1	7,325	31.0	31,218	44.8
50 or Older	9,302	47.4	3,242	30.5	12,544	43.1
Total	36,818	48.0	12,014	30.0	48,832	43.6

Driver Shoulder Belt Use by Site Characteristics

Driver shoulder belt use rates stratified by site type and area type are presented in Tables 4 and 5, respectively. Table 4 indicates that shoulder belt use for drivers exiting from freeways is higher (53.4 percent) than for drivers at other locations (47.4 percent). This is a recurrent phenomena that has been present since 1986.

Shoulder belt use in city versus suburban areas is presented in Table 5. City areas are characterized as central business district areas; while suburban areas include commercial, industrial, and/or residential locations outside of the central business district. Data shown in the tables indicate that drivers within city areas use shoulder belts at a slightly higher rate than drivers in the suburbs, 49.1 percent versus 48.9 percent.

Table 4. Driver shoulder belt use by site type.

Site Type	Base	Percent Restrained
Primary Road	60,826	47.4
Freeway Exit	23,196	53.4
Total	84,022	49.0

Table 5. Driver shoulder belt use by area type.

Area Type	Base	Percent Restrained
City	60,680	49.1
Suburb	23,342	48.9
Total	84,022	49.0

Shoulder Belt Use by Vehicle Manufacturer

Driver shoulder belt use by vehicle manufacturer is presented in Table 6. Drivers of Toyota vehicles were wearing safety belts in 64.1 percent of those observed, the highest of any manufacturer. Shoulder belt use for drivers of imported vehicles was higher than shoulder belt use for drivers of domestic vehicles, 57.3 percent versus 45.0 percent, respectively.

Table 6. Driver shoulder belt use by vehicle manufacturer.

Vehicle Manufacturer	Base	Percent Restrained
Chrysler	8,520	45.6
Ford	15,149	48.9
GM	32,797	43.1
Honda	4,702	62.7
Mazda	1,456	63.0
Nissan	4,420	51.1
Toyota	6,368	64.1
VW	1,980	52.7
Other Imports	8,630	52.6
Domestic Total	56,466	45.0
Import Total	27,556	57.3
Total	84,022	49.0

Driver Safety Belt Misuse

The data shown in Table 7 summarizes driver shoulder belt misuse stratified by sex and age. Misuse of the shoulder restraint by drivers was classified into three categories: under the arm (i.e., shoulder belt under the driver's left arm), behind the back (i.e., shoulder belt positioned behind the driver's torso resulting in no restraint of the upper body), and loose (i.e., shoulder belt having a fist width or more of slack near the chest area or excessive slack in the belt behind the driver). The driver shoulder belt use percentages shown previously in Tables 2 and 3 include misuse as part of the percentages classified as restrained.

The data in Table 7 indicates that female drivers have a higher rate of misuse than male drivers in 1990 primarily due to the difference in "under arm" misuse. Also revealed in the table, all drivers in the 50 years or older category have a higher tendency to misuse the shoulder belt apparatus than any other age group. Similar trends have existed in the driving population since 1986, the first year of identifying driver shoulder belt misuse.

The overall misuse rate is 2.0 percent of the drivers identified as restrained by shoulder belts in Tables 2 and 3.

Table 7. Driver shoulder belt misuse by sex and age.

Age Group	Base	Percent Misuse			Total Percent Misused
		Under Arm	Behind Back	Loose	
<u>Female</u>					
Under 20	256	0.8	0.4	1.6	2.7
20 - 24	5,401	1.6	0.2	0.5	2.3
25 - 49	23,215	1.6	0.2	0.7	2.5
50 or Older	6,318	2.1	0.4	1.2	3.7
Subtotal	35,190	1.7	0.2	0.8	2.7
<u>Male</u>					
Under 20	302	0.7	0.0	0.7	1.3
20 - 24	4,768	0.9	0.1	0.4	1.3
25 - 49	31,218	0.7	0.1	0.6	1.4
50 or Older	12,544	1.0	0.1	0.8	1.9
Subtotal	48,832	0.8	0.1	0.6	1.5
Total	84,022	1.2	0.2	0.7	2.0

Shoulder Belt Misuse by Vehicle Manufacturer

Driver shoulder belt misuse by vehicle manufacturer for those drivers observed utilizing shoulder belts is presented in Table 8. Drivers of domestic vehicles misused the shoulder belt system more than drivers of imported vehicles. The highest rate of the observed misuse was in General Motors and Ford vehicles, 2.4 percent, and the least was in Mazda vehicles, 1.1 percent.

Table 8. Driver shoulder belt misuse by vehicle manufacturer.

Vehicle Manufacturer	Base	Percent Misuse			Total Percent Misused
		Under Arm	Behind Back	Loose	
Chrysler	8,520	0.9	0.1	0.6	1.6
Ford	15,149	1.3	0.2	0.8	2.4
General Motors	32,797	1.2	0.2	1.0	2.4
Volkswagen	1,980	1.3	0.1	0.3	1.6
Toyota	6,368	1.2	0.1	0.2	1.5
Datsun/Nissan	4,420	1.4	0.0	0.2	1.6
Honda	4,702	1.3	0.1	0.3	1.7
Mazda	1,456	0.8	0.1	0.3	1.1
Other Imports	8,630	1.1	0.1	0.2	1.4
Domestic Total	56,466	1.2	0.2	0.9	2.2
Import Total	27,556	1.2	0.1	0.2	1.5
Total	84,022	1.2	0.1	0.8	2.0

VERIFICATION OF THE PASSENGER VEHICLE ALL RESTRAINT SYSTEM DATABASE

The field observers noted license plate numbers during their field surveys for the All Restraint Study and the Automatic Restraint Studies. It was, however, not possible for them to determine the model year of the vehicles surveyed during the field observation period. Therefore, model year and other vehicle characteristics were ascertained by decoding the vehicle identification number (VIN) supplied by participating states.

Vehicles observed in the states of Georgia and Pennsylvania could not be used in the verified database due to either state laws prohibiting the release of such information or the state agency's inability to provide the required information. Because of this, vehicles observed in Atlanta and Pittsburgh could not be included in the database of verified vehicles.

A total of 59,510 valid vehicle records that included vehicle make, model year, wheel base, and restraint type were identified through the Vindicator Program, out of a total of 75,539 vehicles observed in the field. Possible reasons for the non-valid records may be attributed to the following:

- Pre-1967 model year vehicles could not be processed by the Vindicator Program.
- VIN numbers prior to 1981 were not standardized. Although Vindicator will go through a sub-routine process to identify the VIN's, it may estimate vehicle information, creating a degree of ambiguity. Any record which revealed any ambiguity upon processing was not included in this section of the report.
- Observer error when identifying and recording the license plate numbers or restraint type may also have added a small percentage to the non-verified group.

Table 9 shows an overall driver shoulder belt use rate of 49.7 percent for the 17 cities whose data were processed by the Vindicator Program. If the cities of Atlanta and Pittsburgh were deleted from the 19-city non-verified database (Table 1), the overall driver shoulder belt use rate would be 49.4 percent, nearly identical to the verified data shown in Table 9. The basic trend revealed in this table shows that the newer the vehicle, the more apt the driver is to be restrained. This phenomena has been detected in each of the previous four years' studies.

Table 9. Driver shoulder belt use by model year (verified).

Model Year	Base	Percent Restrained
1967	54	11.1
1968	77	19.5
1969	89	29.2
1970	138	26.1
1971	169	30.2
1972	255	24.3
1973	378	24.6
1974	438	24.0
1975	453	32.5
1976	866	31.8
1977	1,238	32.4
1978	1,819	34.2
1979	2,106	33.3
1980	2,128	35.4
1981	2,697	40.7
1982	2,752	42.4
1983	3,403	45.6
1984	5,166	46.3
1985	5,754	48.7
1986	6,232	52.4
1987	6,555	54.4
1988	6,786	58.1
1989	6,578	62.6
1990	3,174	70.7
1991	205	55.1
Total	59,510	49.7

Table 10 shows verified driver shoulder belt use rate as a function of vehicle size and type. Drivers of imported vehicles had a 58.4 percent belt use rate as compared to 45.5 percent for drivers of domestic vehicles. The use rate difference between domestic and imported vehicles may be attributed to the size and age mix of the vehicles on the roadways. Over 90 percent of all import vehicles have a wheelbase less than or equal to 110 inches whereas approximately 70 percent of domestic vehicles are in that classification. The average age of imported vehicles was found to be 6.7 years as opposed to 7.8 years for the domestic vehicles.

Table 10. Driver shoulder belt use by vehicle size and type (verified).

Vehicle Size	Vehicle Type		Total
	Domestic	Import	
Subcompact WB \leq 101 in.	49.5% (12,388)	55.1% (13,116)	52.4% (25,504)
Compact 101 in. < WB \leq 110 in.	46.7% (15,087)	68.2% (5,356)	52.3% (20,443)
Midsize 111 in. < WB \leq 120 in.	42.3% (10,770)	47.2% (472)	42.5% (11,242)
Full Size WB > 120 in.	31.0% (2,047)	42.9% (170)	31.9% (2,217)
No Data	22.7% (88)	43.8% (16)	26.0% (104)
Total	45.5% (40,380)	58.4% (19,130)	49.6% (59,510)

Note: Percentages indicate the safety belt use rates of the base number of observations shown in parenthesis.

Table 11 shows shoulder belt misuse by model year. Overall, 2.1 percent of the restrained drivers in verified vehicles misused their shoulder belt.

Table 11. Driver shoulder belt misuse by model year (verified).

Model Year	Base	Percent Misuse			Total Percent Misuse
		Under Arm	Behind Back	Loose	
1967	54	0.0	0.0	0.0	0.0
1968	77	0.0	0.0	0.0	0.0
1969	89	0.0	0.0	0.0	0.0
1970	138	0.0	0.7	0.0	0.7
1971	169	0.6	0.0	1.2	1.8
1972	255	0.8	0.0	1.2	1.9
1973	378	0.5	0.3	1.0	1.8
1974	438	0.7	0.0	0.2	0.9
1975	453	0.0	0.4	0.9	1.3
1976	866	0.9	0.7	0.5	2.1
1977	1,233	1.3	0.5	0.8	2.6
1978	1,819	1.2	0.3	1.2	2.7
1979	2,106	0.9	0.4	0.8	2.1
1980	2,128	1.4	0.2	0.8	2.4
1981	2,697	0.7	0.1	1.0	1.8
1982	2,752	1.2	0.1	0.7	2.0
1983	3,403	0.9	0.1	0.6	1.6
1984	5,166	0.8	0.2	0.7	1.7
1985	5,754	1.4	0.1	0.8	2.3
1986	6,232	1.6	0.1	0.8	2.5
1987	6,555	1.2	0.2	0.5	1.8
1988	6,786	1.6	0.1	0.7	2.3
1989	6,578	1.4	0.1	0.7	2.2
1990	3,174	1.1	0.1	0.2	1.3
1991	205	0.5	0.0	0.0	0.5
Total	59,510	1.2	0.2	0.7	2.1

PASSENGER OBSERVATION FINDINGS

A total of 45,300 passengers were observed at shopping center exits and entrances during 1990. If a vehicle had a passenger under the age of 13, all passengers (driver excluded) were included in the sample. 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. Figure 6 shows the restraint system use of passengers in the sample over the past five years. In 1990, infants were found to be correctly restrained in infant seats 68.2 percent, toddlers to be correctly restrained in toddler seats 74.5 percent, subteens restrained by booster seat or safety belt 51.0 percent, teens and adults restrained by safety belt 26.0 and 43.7 percent, respectively.

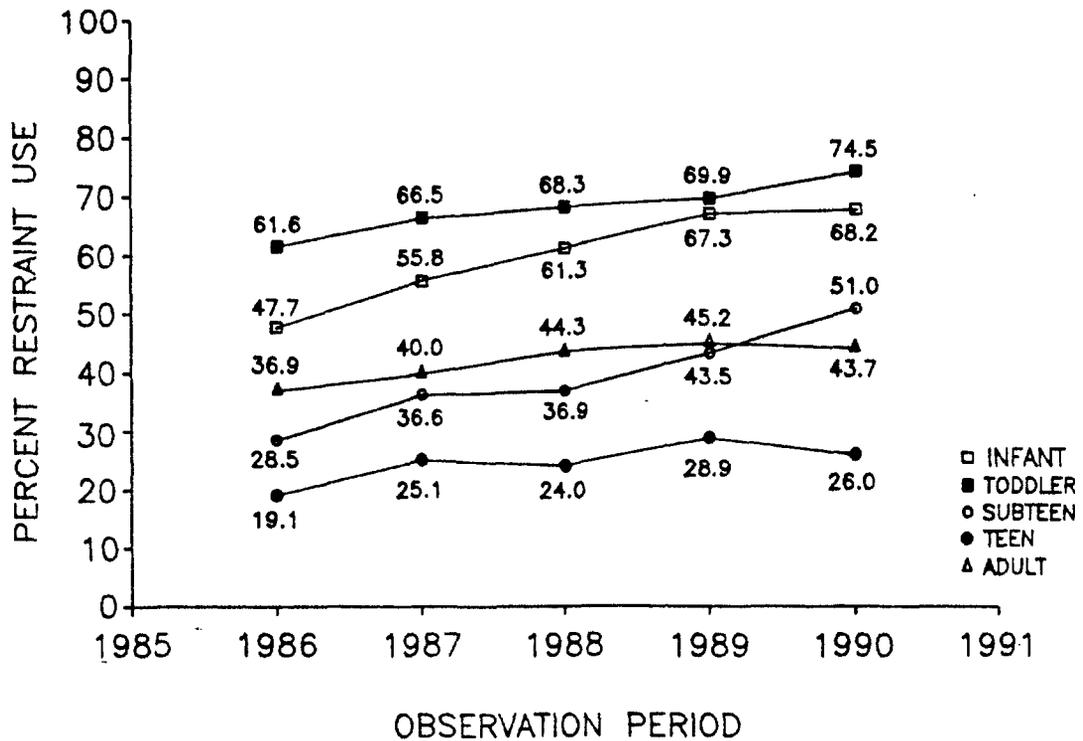


Figure 6. Trend of passenger restraint system use.

Infants (Under 1 Year)

A total of 1,382 infants were observed during the passenger observation study. Of this sample, 82.6 percent were observed in infant safety seats. Of the 82.6 percent observed in infant seats, 68.2 percent were properly restrained, 5.6 percent were incorrectly restrained, and 8.8 percent of the infants were observed to be restrained in the "wrong direction" (wrong direction refers to either the child or the child seat not facing the rear of the vehicle). Table 12 summarizes the infant passenger observations.

Table 12. Methods of restraining infants.

Type of Restraint	Base	Percent
<u>Child in Safety Seat</u>	1,142	82.6
Correctly Restrained	943	68.2
Incorrectly Restrained	77	5.6
Wrong Direction	122	8.8
<u>Safety Belt</u>	11	0.8
<u>On Lap</u>	207	15.0
<u>None</u>	22	1.6
Total	1,382	100.0

Use of child safety seats in the sample of 1,382 observations are further subdivided by city in Table 13. Data from the city of San Francisco shows that infants were observed in a child safety seat 89.9 percent of the time and were properly restrained 79.8 percent, highest among the 19 cities. The lowest use of safety seats and infants being properly restrained was found in New Orleans, 54.7 percent and 49.1 percent, respectively.

Table 13. Infants restrained by safety seats by city.

City	Base	Percent in Safety Seat	Percent Properly Restrained in Safety Seat
Atlanta	79	72.2	62.0
Baltimore	74	86.5	75.7
Birmingham	57	80.7	54.4
Boston	62	87.1	75.8
Chicago	90	88.9	78.9
Dallas	78	85.9	78.2
Fargo/Moorhead	69	85.5	58.0
Houston	40	65.0	55.0
Los Angeles	70	90.0	65.7
Miami	64	75.0	56.3
Minneapolis/St. Paul	45	77.8	71.1
New Orleans	53	54.7	49.1
New York	88	67.0	55.7
Phoenix	71	74.6	63.4
Pittsburgh	65	87.7	60.0
Providence	88	89.8	76.1
San Diego	110	94.5	77.3
San Francisco	109	89.9	79.8
Seattle	70	91.4	77.1
Total Sample and Average of Total Sample	1,382	82.6	68.2

Table 14 presents infant safety seat use by seating position. Infants were most commonly transported in the front outboard passenger position, although the back seat center position had a higher percentage of correctly restrained infants.

Table 14. Safety seat use for infants by seat position.

Seat Position	Base	Percent Observed in Safety Seat	Percent Appears Correct
Front Seat - Center	31	80.6	58.1
Front Seat - Outboard	663	77.7	70.0
Total Front Seat	694	77.8	69.4
Back Seat - Driver	198	82.3	61.1
Back Seat - Center	256	96.9	75.8
Back Seat - Outboard	223	83.4	63.7
Total Back Seat	677	88.2	67.5
Rear (for station wagons, hatchbacks and minivans)	11	45.4	36.4
Total	1,382	82.6	68.2

Toddlers (Ages 1-4 Years)

Toddler observations consisted of recording similar data as collected for infants. 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/lap belt system was properly utilized.

A total of 11,603 toddlers were observed during the passenger study. Table 15 shows that 83.2 percent were in toddler seats and 1.5 percent were in booster seats. Of the toddlers not observed in safety seats, 6.6 percent were unrestrained in another passenger's lap, 5.4 percent were observed using no restraint, and 3.3 percent were restrained by a safety belt.

Table 15. Methods of restraining toddlers.

Type of Restraint	Base	Percent
<u>Safety Seat</u>		
Toddler Seat	9,645	83.2
Booster Seat	179	1.5
<u>Unrestrained</u>		
On Lap	770	6.6
No Restraint	630	5.4
Safety Belt	379	3.3
Total	11,603	100.0

Table 16 shows restraint use by city for toddlers. A brief summary of this table is as follows:

- 96.6 percent of the 1.5 percent using booster seats were correctly restrained.
- Of the 83.2 percent in toddler seats, 89.7 percent were correctly restrained. Phoenix data showed a 96.2 percent (highest of 19 cities) correct use rate and the Fargo/Moorhead sample showed a 76.5 percent (lowest of 19 cities) correct use rate.
- 84.7 percent of the toddlers were observed in a booster or toddler seat and 89.8 percent of them were restrained correctly.

Table 16. Restraint system use by city for toddlers.

A City	B Base	C Percent of Col. B in Booster Seat	D Percent of Col. C Correctly Restrained in Booster Seats	E Percent of Col. B in Toddler Seats	F Percent of Col. E Correctly Restrained in Toddler Seat	G Percent of Col. B in Safety Seat (Total of Cols. C & E)	H Percent of Col. G Correctly Restrained in Safety Seat	I Percent of Col. B Restrained by Safety Seat	J Percent of Col. B Not Restrained
Atlanta	494	0.6	0.0	73.9	87.7	74.5	87.7	8.9	16.6
Baltimore	942	3.5	100.0	80.7	93.9	84.2	94.2	4.9	10.9
Birmingham	311	0.6	100.0	82.6	82.9	83.2	83.0	1.0	15.8
Boston	569	1.9	100.0	80.8	94.6	82.7	94.7	5.1	12.1
Chicago	754	3.2	95.8	80.1	95.5	83.3	95.5	4.4	12.3
Dallas	745	0.0	--	88.7	88.2	88.7	88.2	0.5	10.7
Fargo/Moorhead	387	0.0	--	87.8	76.5	87.8	76.5	3.4	8.8
Houston	594	0.0	--	87.5	86.5	87.5	86.5	0.2	12.3
Los Angeles	440	0.2	100.0	84.1	82.4	84.3	82.5	2.3	13.4
Miami	362	0.0	--	88.7	80.1	88.7	80.1	1.9	9.4
Minn./St. Paul	690	0.0	--	92.5	87.0	92.5	87.0	1.2	6.4
New Orleans	827	1.9	100.0	76.8	91.0	78.7	91.2	4.8	16.4
New York	643	0.2	100.0	77.3	90.1	77.5	90.2	0.8	21.8
Phoenix	745	1.9	100.0	80.9	96.2	82.8	96.3	4.3	12.9
Pittsburgh	359	0.0	--	87.2	79.6	87.2	79.6	5.3	7.5
Providence	930	3.2	96.7	83.5	96.1	86.7	96.2	2.6	10.6
San Diego	599	3.8	100.0	82.6	93.1	86.4	93.4	5.7	7.8
San Francisco	801	2.6	95.2	82.1	92.1	84.7	92.2	3.0	12.2
Seattle	411	0.0	--	90.3	84.1	90.3	84.1	0.7	9.0
Total	11,603	1.5	96.6	83.2	89.7	84.7	89.8	3.3	12.1

- 3.3 percent of the toddlers were restrained by a safety belt.
- 12.1 percent of the total sample of 11,603 toddlers observed were not restrained.

The relationship between seating position and safety seat/belt use is summarized in Table 17. Toddlers were observed most often in the back seat center position and restrained properly by a child safety seat in 91.1 percent of those observations.

Table 17. Safety seat use for toddlers by seat position.

Seat Position	Base	Percent Observed Using Safety Belt	Percent Observed In Toddler Seats	Percent Observed In Booster Seats	Percent Observed In Safety Seats	Percent in Safety Seat Correctly Restrained
Front Seat - Center	140	3.6	51.4	0.0	51.4	83.3
Front Seat - Outboard	2,231	8.2	58.7	1.4	60.1	87.8
Total Front Seat	2,371	8.0	58.3	1.3	59.6	87.5
Back Seat - Driver	3,000	2.1	88.7	1.6	90.3	90.0
Back Seat - Center	3,137	0.9	92.4	0.8	93.2	91.1
Back Seat - Outboard	3,008	2.7	88.0	2.4	90.4	89.6
Total Back Seat	9,145	1.9	89.8	1.6	91.3	90.2
Rear (for station wagons, hatchbacks and minivans)	87	21.8	63.2	3.4	66.7	86.2
Total	11,603	3.3	83.2	1.5	84.7	89.8

Subteens (Ages 5 to 12 Years)

Table 18 indicates a total of 18,284 subteen passengers were observed in the 19 cities during the passenger study. The overall safety belt use of this age group was found to be 49.1 percent in 1990. Another 2.1 percent of the sample were restrained in safety seats; resulting in a total of 51.2 percent of the subteen passengers being restrained. This compares to the 43.5 percent and 36.9 percent use rates observed in 1989 and 1988, respectively.

Seattle had the highest restraint use rates, 61.0 percent using safety belts and 2.5 percent in safety seats; New York had the lowest, 21.8 percent and 0.9 percent, respectively.

Table 18. Safety belt use by city for subteen passengers.

City	Base	Percent Restrained in Safety Seat	Percent Restrained by Safety Belt	Percent Not Restrained
Atlanta	917	1.7	45.7	52.6
Baltimore	398	3.8	43.2	53.0
Birmingham	1,662	2.0	41.5	56.5
Boston	981	1.1	55.5	43.4
Chicago	696	0.9	38.5	60.6
Dallas	153	11.7	30.1	58.2
Fargo/Moorhead	1,553	1.9	46.3	51.8
Houston	718	2.8	48.0	49.2
Los Angeles	1,556	2.4	53.4	44.2
Miami	1,575	0.9	54.6	44.5
Minneapolis/St. Paul	749	3.9	57.6	38.5
New Orleans	363	3.3	37.5	59.2
New York	527	0.9	21.9	77.2
Phoenix	723	1.0	39.1	59.9
Pittsburgh	1,750	1.9	59.8	38.3
Providence	587	2.0	35.3	62.7
San Diego	1,382	2.9	54.9	42.2
San Francisco	625	1.4	43.1	55.5
Seattle	1,369	2.5	61.1	36.4
Total	18,284	2.1	49.1	48.8

Table 19 presents restraint use by seating position for subteen passengers. In 1990, a total of 7,408 subteens were identified in the front seat outboard position. They were restrained 62.3 percent of the time, more than in any other seating position.

Table 19. Passenger safety belt use for subteens by seat position.

Seat Position	Base	Percent Restrained
Front Seat - Center	619	15.0
Front Seat - Outboard	7,408	62.3
Total Front Seat	8,027	58.7
Back Seat - Driver	3,384	51.2
Back Seat - Center	2,106	15.8
Back Seat - Outboard	4,109	51.3
Total Back Seat	9,599	43.5
Rear (for station wagons, hatchbacks and minivans)	658	14.0
Total	18,284	49.1

Teens (Ages 13 to 19 Years)

Table 20 contains data on the 2,316 teenage passengers observed in the 1990 19-city passenger study. Overall, safety belt use was 26.0 percent, lowest of all age categories, down from 28.9 percent in 1989. Teen restraint use ranged from a high of 37.5 percent in San Diego to a low of 15.2 percent in Chicago.

Table 20. Passenger safety belt use for teens by city.

City	Base	Percent Restrained
Atlanta	131	22.9
Baltimore	43	32.6
Birmingham	176	17.0
Boston	113	22.1
Chicago	79	15.2
Dallas	90	34.4
Fargo/Moorhead	187	24.1
Houston	168	25.6
Los Angeles	150	30.7
Miami	143	32.9
Minneapolis/St. Paul	143	27.3
New Orleans	59	16.9
New York	80	21.3
Phoenix	100	18.0
Pittsburgh	133	26.3
Providence	99	19.2
San Diego	176	37.5
San Francisco	74	21.6
Seattle	172	34.9
Total	2,316	26.0

Teen safety belt use rates by seating position are shown in Table 21. Analysis shows that teens were most often observed in the front seat outboard position and were restrained in 42.0 percent of the cases.

Table 21. Passenger safety belt use for teens by seat position.

Seat Position	Base	Percent Restrained
Front Seat - Center	60	1.7
Front Seat - Outboard	870	42.0
Total Front Seat	930	39.4
Back Seat - Driver	510	20.2
Back Seat - Center	182	4.4
Back Seat - Outboard	614	19.9
Total Back Seat	1,306	17.8
Rear (for station wagons, hatchbacks and minivans)	80	5.0
Total	2,316	26.0

Adults (Ages 20 and Older)

A total of 11,715 adults were observed in the passenger study in 1990. Restraint system use among adult passengers was found to be 43.7 percent. Analysis of the data in Table 22 shows that the highest use rate (55.1 percent) was in San Diego and the lowest use rate (32.0 percent) was in Providence. In 1989, adults in San Diego had the highest restraint use rate (58.1 percent) and New York had the lowest use rate (25.9 percent).

Table 22. Passenger safety belt use for adults by city.

City	Base	Percent Restrained
Atlanta	512	41.6
Baltimore	593	40.1
Birmingham	680	35.0
Boston	482	42.7
Chicago	582	38.1
Dallas	542	47.4
Fargo/Moorhead	623	36.6
Houston	602	49.7
Los Angeles	700	47.0
Miami	713	49.6
Minneapolis/St. Paul	560	50.7
New Orleans	506	36.4
New York	614	32.7
Phoenix	566	45.4
Pittsburgh	642	50.3
Providence	594	32.0
San Diego	925	55.1
San Francisco	633	40.6
Seattle	646	51.9
Total	11,715	43.7

In vehicles with a child under 13 years old, adults were observed most often in the front outboard seating position and were restrained in 50.9 percent of the observations. Table 23 contains the supporting data. Adult passengers observed travelling in the back seat of these vehicles were restrained only 13.6 percent of the time.

Table 23. Passenger safety belt use for adults by seat position.

Seat Position	Base	Percent Restrained
Front Seat - Center	232	2.2
Front Seat - Outboard	9,250	52.1
Total Front Seat	9,482	50.9
Back Seat - Driver	909	14.0
Back Seat - Center	177	2.3
Back Seat - Outboard	1,117	15.0
Total Back Seat	2,203	13.6
Rear (for station wagons, hatchbacks and minivans)	30	6.7
Total	11,715	43.7

OBSERVATIONS OF TODDLER SAFETY SEAT INSTALLATION

Passenger observations were made from curb locations near the entrance/exit points of selected shopping malls in all 19 cities. Due to the limited amount of observation time available for each vehicle, the assessment of several aspects of child safety seats were difficult or impossible to obtain. For example, difficulty was encountered in observing safety seat manufacturer, and correct vehicle safety belt tether use during passenger observations. As a result, the primary toddler safety seat observation in the passenger study was that of observing if the child was harnessed in the safety seat and whether a shield was used (for those safety seats designed with shields). The Toddler Safety Seat Observation Study was designed to provide information on safety seat installation that could not be obtained as part of the passenger observation. Infant seat information was not collected during this study. Many infants traveling in cars are restrained in convertible safety seats which doubles as a carrier outside the vehicle and a safety seat inside the vehicle. Also, field observations showed that parents may have detached the safety belt securing the infant seat or altered the belt position when removing an infant.

During this study, 3,483 toddler safety seats were observed in parked vehicles at the same shopping malls used for the passenger observations. Table 24 presents data on safety seat fastening to the vehicle car seat by manufacturer and model. Century toddler seats were observed more frequently than any other toddler seat manufacturer. However, in looking at individual models, the One Step, manufactured by Evenflo, was the most frequently observed seat.

Table 24. Types of toddler safety seats and percent correctly fastened.

Manufacturer/Model	Base	Percent Correctly Fastened	Percent Incorrectly Fastened	Percent Car Belt Not Used	Percent of Grand Total
Century Total	(1,057)	(89.4)	(9.3)	(1.3)	(30.3)
100	109	71.6	28.4	0.0	
200	209	87.6	12.0	0.5	
300	174	81.6	17.2	1.1	
400 XL	35	100.0	0.0	0.0	
1000 STE	117	93.2	6.0	0.9	
2000 STE	120	95.8	3.3	0.8	
2500 STE	149	98.0	0.0	2.0	
3000 STE	118	97.5	0.8	1.7	
5000 STE	14	100.0	0.0	0.0	
Child Love	4	0.0	0.0	100.0	
Unknown	8	100.0	0.0	0.0	
Collier-Keyworth Total	(53)	(86.8)	(13.2)	(0.0)	(1.5)
Roundtripper	10	80.0	20.0	0.0	
Safe & Sound	39	87.2	12.8	0.0	
Sprint Convertible	4	100.0	0.0	0.0	
Cosco Total	(294)	(86.7)	(10.5)	(2.7)	(8.4)
Auto Trak	16	100.0	0.0	0.0	
Commuter	86	97.7	2.3	0.0	
Commuter 5-Pt.	30	100.0	0.0	0.0	
Safe & Easy	37	89.2	8.1	2.7	
Safe & Snug	46	89.1	10.9	0.0	
Safe-T-Mate	13	61.5	38.5	0.0	
Safe-T-Seat	37	70.3	29.7	0.0	
Safe-T-Shield	20	75.0	25.0	0.0	
Travel Hi-Lo	7	0.0	0.0	100.0	
Unknown	2	100.0	0.0	0.0	
Evenflo Total	(768)	(85.8)	(12.2)	(2.0)	(22.1)
7-Year Car Seat	89	93.3	4.5	2.2	
One Step	601	83.5	14.8	1.7	
Ultra	77	94.8	1.3	3.9	
Unknown	1	100.0	0.0	0.0	

Table 24. Types of toddler safety seats and percent correctly fastened (continued).

Manufacturer/Model	Base	Percent Correctly Fastened	Percent Incorrectly Fastened	Percent Car Belt Not Used	Percent of Grand Total
Fisher-Price Car Seat	(298)	(90.9)	(7.7)	(1.3)	(8.6)
Ford Tot Guard	(2)	(50.0)	(0.0)	(50.0)	(0.0)
Gerry Guardian	(51)	(94.1)	(3.9)	(2.0)	(1.5)
Graco Little Traveler	(4)	(100.0)	(0.0)	(0.0)	(0.1)
International Manufacturing Teddy-Tot Astroseat	(45)	(71.1)	(20.0)	(8.9)	(1.3)
Kolcraft Total	(82)	(90.2)	(4.9)	(4.9)	(2.4)
Dial-A-Fit	47	93.6	4.3	2.1	
Hi-Rider	6	83.3	16.7	0.0	
Perfect Fit	2	100.0	0.0	0.0	
Quick Step	4	100.0	0.0	0.0	
Redi-Rider	4	75.0	25.0	0.0	
Ultra Ride	13	76.9	0.0	23.1	
Unknown	6	100.0	0.0	0.0	
Nissan Child Safety Seat	(110)	(92.7)	(1.8)	(5.5)	(3.2)
Pride-Trimble (Total)	(17)	(94.1)	(5.9)	(0.0)	(0.5)
Questor Total	(32)	(71.9)	(0.0)	(28.1)	(0.9)
Bobby-Mac Champion	10	30.0	0.0	70.0	
Bobby-Mac Deluxe II	2	50.0	0.0	50.0	
Bobby-Mac Unknown	4	75.0	0.0	25.0	
Kantwet Care Seat	7	100.0	0.0	0.0	
Kantwet Safeguard	9	100.0	0.0	0.0	

Table 24. Types of toddler safety seats and percent correctly fastened (continued).

Manufacturer/Model	Base	Percent Correctly Fastened	Percent Incorrectly Fastened	Percent Car Belt Not Used	Percent of Grand Total
Strolee Total	(658)	(73.1)	(26.3)	(0.6)	(18.9)
GT 2000	16	93.8	6.2	0.0	
GT 3000	28	92.9	7.1	0.0	
Wee Care 500	90	6.7	93.3	0.0	
Wee Care 600, 614 & 615	523	82.8	16.4	0.8	
Unknown	1	100.0	0.0	0.0	
Welsh Travel Tot	(2)	(100.0)	(0.0)	(0.0)	(0.0)
Other	(10)	(90.0)	(10.0)	(0.0)	(0.3)
Total	3,483	85.2	12.8	2.0	100.0

Within the toddler seat category, two types of systems were 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 strap. Of the 3,483 toddler seats, 3,389 (97.3 percent) required fastening by the seat belt only and 94 (2.7 percent) required use of the seat belt and tether, refer to Table 25. Child safety seats requiring only a safety belt for installation were observed to be correctly installed 87.4 percent of the time, whereas those requiring a tether were much less likely to be installed correctly, 6.4 percent. Overall, 85.2 percent of the toddler seats observed were properly secured.

Table 25. Toddler seat with belt only and with belt and tether strap.

Seat Fastening Type	Base	Percent Correctly Restrained
Seats Requiring Seat Belt Only	3,389	87.4
Seats Requiring Seat Belt and Tether Straps	94	6.4
Overall	3,483	85.2

Table 26 subdivides the toddler seat information into two categories, plastic safety seats and safety seats that make use of metal tubing construction. Of the 3,483 toddler seats observed, 1,120 were of all plastic design and were properly installed 93.6 percent of the time. This compares to 2,363 toddler seats utilizing a metal tube construction design that were properly installed 83.7 percent of the time. The total in this table refers to only the proper routing of the safety belt, independent of use or non-use of the tether strap. Safety seats that are made of all plastic design usually provide slots or notches allowing for easy identification of correct safety belt routing.

Table 26. Toddler seat belt installation.

Frame Type	Base	Percent Fastened Correctly by Safety Belt	Percent Incorrectly Fastened by Safety Belt	Percent Not Restrained by Safety Belt
Plastic	1,120	93.6	2.6	3.8
Metal Tube	2,363	83.7	15.2	1.1
Total	3,483	86.9	11.1	2.0

MOTORCYCLE/MOPED OBSERVATION FINDINGS

In 1990, observations were made on operators and passengers of motorcycles and mopeds regarding helmet use. Out of 11,634 motorcycle and 943 moped observations, the percentage of operators wearing helmets was 59.8 percent and 43.9 percent, respectively. Table 27 presents the helmet use rate for motorcycle operators and passengers by city and by the existence of a HUL (mandatory helmet use law). The State of Washington passed a mandatory helmet use law in 1989. Enforcement of this law began prior to the 1990 third quarter data collection period. This in affect has increased the 1990 helmet use rate to 82.2 percent, up from 59.5 percent in 1989.

Table 27. Motorcycle helmet use in 1990.

City	Operator Base	Percent Helmet On	Passenger Base	Percent Helmet On
Atlanta*	268	96.3	20	75.0
Baltimore	386	44.6	42	45.2
Birmingham*	456	100.0	62	100.0
Boston*	374	99.5	56	100.0
Chicago	438	21.0	70	17.1
Dallas*	559	99.6	81	97.5
Fargo/Moorhead	616	34.4	96	31.3
Houston*	650	91.5	90	90.0
Los Angeles	1,153	33.5	155	16.8
Miami*	587	99.3	67	100.0
Minneapolis/St. Paul	676	35.9	92	47.8
New Orleans*	368	99.7	40	100.0
New York*	313	99.7	31	100.0
Phoenix	1,213	32.6	141	20.6
Pittsburgh*	412	99.5	34	100.0
Providence	447	38.3	63	87.3
San Diego	1,112	46.0	117	27.4
San Francisco	1,134	41.9	149	30.9
Seattle*	472	82.2	54	74.1
HUL Cities*	4,459	96.4	535	94.4
Non-HUL Cities	7,175	37.0	925	31.7
Total	11,634	59.8	1,460	54.7

* Mandatory Helmet Use Law (HUL)

Figure 7 illustrates the trend of motorcycle operator helmet use for the past five observation periods for the cities with a HUL, without a HUL, and their combined totals.

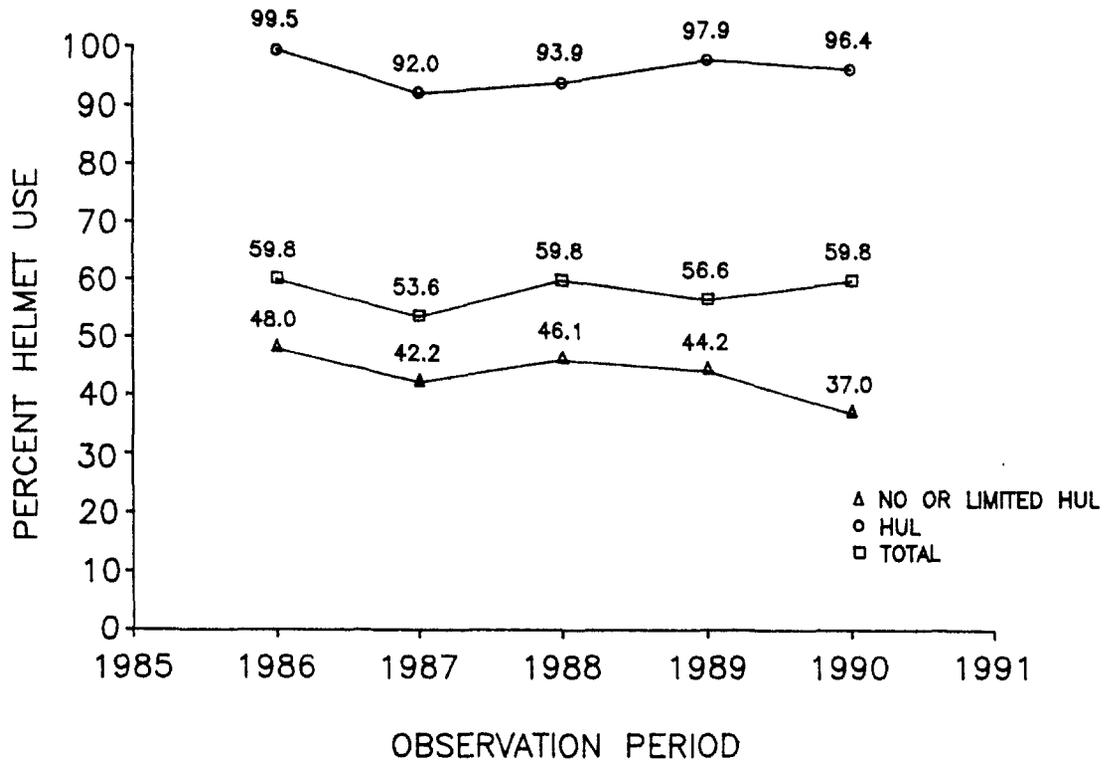


Figure 7. Motorcycle helmet use trend for operators by the existence of mandatory helmet use law.

Table 28 presents helmet use rates by city for operators and passengers on mopeds (motorized bicycles).

Table 28. Moped helmet use in 1990.

City	Driver Base	Percent Helmet On	Passenger Base	Percent Helmet On
Atlanta	12	91.7	0	--
Baltimore	31	19.4	2	0.0
Birmingham	10	90.0	3	100.0
Boston	11	72.7	1	0.0
Chicago	44	15.9	7	0.0
Dallas	41	100.0	4	100.0
Fargo/Moorhead	14	35.7	0	--
Houston	36	69.4	1	100.0
Los Angeles	90	15.6	5	0.0
Miami	39	92.3	2	100.0
Minneapolis/St. Paul	31	29.0	3	0.0
New Orleans	22	95.5	4	75.0
New York	35	97.1	0	--
Phoenix	108	13.9	6	16.7
Pittsburgh	7	100.0	0	0.0
Providence	19	0.0	1	100.0
San Diego	149	28.2	9	0.0
San Francisco	214	47.7	21	28.6
Seattle	30	73.3	0	--
Total	943	43.9	69	30.4

OBSERVATIONS OF CARS WITH AUTOMATIC SAFETY BELTS

Beginning with the 1987 model year vehicles, United States auto-makers were required to equip 10 percent of their passenger vehicles with a passive restraint system. This percentage has increased each year to 100 percent of the 1990 model year passenger vehicles. Manufacturers may provide either an automatic safety belt system or an air bag system. There are three basic designs for automatic safety belt systems which are in use: (1) a motorized shoulder belt system; (2) a non-motorized shoulder belt system; and (3) a non-motorized shoulder and lap belt combination. A manual lap belt is provided in the vehicles that have an automatic shoulder belt system.

Over the past few years, the number of vehicles observed with automatic safety belt systems has risen from 1.5 percent in 1987 to 10.9 percent in 1990. Because of the increasing number of vehicles with automatic safety belt systems on the road, a special study to observe the restraint use of automatic systems was conducted in 1990. The methodology for collecting data in this study was similar to that of the Passenger Vehicle All Restraint Study, except observations were taken for two hours at each of the thirty sites in each city. Vehicles with automatic safety belts are relatively easy to spot due to the position of the shoulder belt. The observers were also given a list of vehicles that possess an automatic restraint system.

During the Automatic Restraint System Study, information on 32,062 vehicles was collected. Table 29 identifies driver restraint use stratified by city and mandatory seat belt use law (MUL). Overall, driver shoulder belt use was observed in 78.8 percent of the vehicles. In cities where a mandatory restraint use law was in effect, 80.8 percent of the drivers utilized their shoulder belt as opposed to 73.4 percent of the drivers in non-MUL cities, a 7.4 percentage point difference. The stated difference was smaller in the Automatic Study than in the Passenger Vehicle All Restraint Study where shoulder belt use deviated by 18.0 percentage points between MUL and non-MUL cities (Table 1).

Table 29. Driver shoulder belt use for automatic vehicles.

City	Driver Shoulder Belt Use	
	Base	Percent Restrained
Atlanta*	1,845	84.1
Baltimore*	1,704	79.9
Birmingham	2,005	74.3
Boston	1,681	74.8
Chicago*	1,921	64.1
Dallas*	1,774	87.1
Fargo/Moorhead	1,377	74.1
Houston*	1,804	83.5
Los Angeles*	1,786	87.2
Miami*	1,406	79.7
Minneapolis/St. Paul*	1,508	82.3
New Orleans*	1,345	77.9
New York*	1,912	66.7
Phoenix	1,663	82.4
Pittsburgh*	1,724	80.8
Providence	1,855	62.6
San Diego*	1,391	86.2
San Francisco*	1,336	84.8
Seattle*	2,025	89.4
MUL Cities	23,481	80.8
Non-MUL Cities	8,581	73.4
Total	32,062	78.8

* Mandatory safety belt use law (MUL) in effect.

Figure 8 contains driver use of automatic seat belts by vehicle manufacturer. The highest use rate (96.2 percent) was observed in Ford vehicles; and the lowest use rate (64.1 percent) was observed in General Motor vehicles.

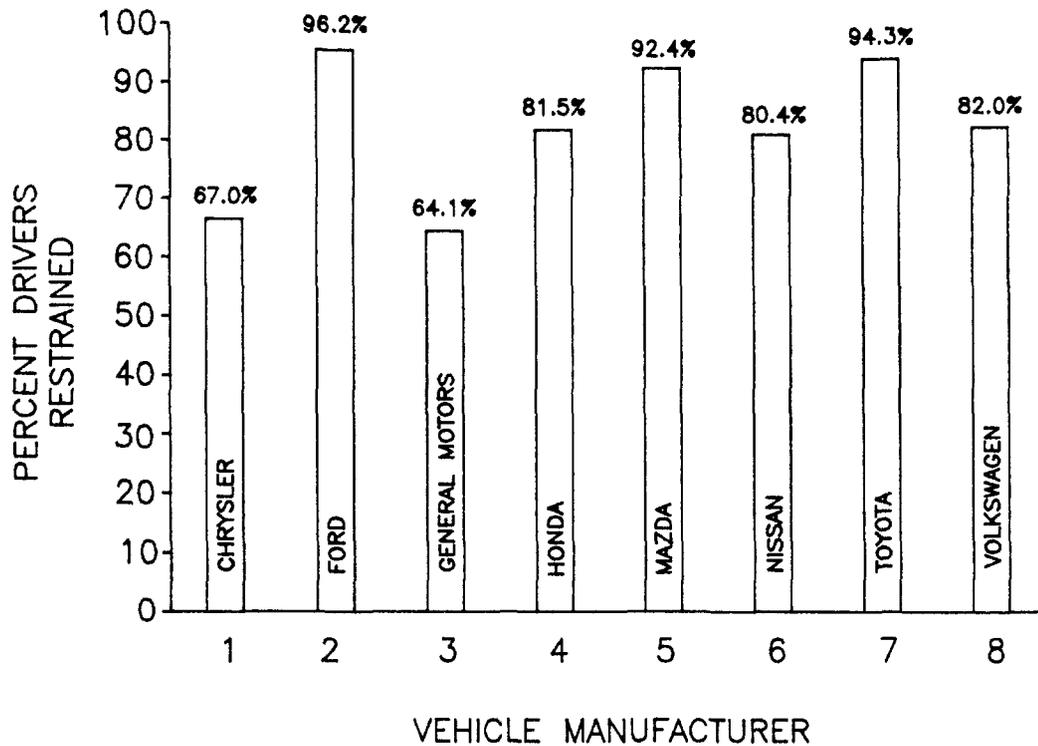


Figure 8. Driver seat belt use by vehicle manufacturer (Automatic Restraint System Study).

The data in Table 30 compares the different types of automatic belt systems. In this study, vehicles equipped with motorized shoulder belt systems without disconnects have the highest rate of use and non-motorized 3-point belt systems have the lowest use rate.

Table 30. Automatic safety belt system comparisons.

Vehicle Manufacturer	Base	Total Percent Restrained
<u>Non-Motorized Three-Point Belt System Shoulder & Lap</u>		
AMC Alliance	5	40.0
Buick Total	2,445	67.0
Cadillac Brougham	28	28.6
Chevrolet Total (Except Geo Prizm Models)	3,321	63.7
Oldsmobile Total	2,593	64.6
Pontiac Total (Except LeMans Models)	3,499	62.0
Honda Accord (NM)	797	73.0
Honda Civic (NM)	217	78.8
Honda CRX	151	76.2
Honda Prelude	407	67.8
Nissan 240 SX (NM)	57	57.9
Nissan 300 ZX	5	40.0
Nissan <u>Axxes</u>	23	87.0
Nissan Sentra (NM)	56	46.4
Volvo 240 Series	2	100.0
Total	13,606	64.9
<u>Non-Motorized Shoulder Belt System</u>		
Chevrolet Geo Prizm	136	64.0
Chrysler LeBaron	268	47.4
Dodge Daytona	111	36.9
Pontiac LeMans (NM)	22	68.2
Daihatsu Charade Sedan	1	0.0
Daihatsu CLS	2	50.0
Hyundai Excel (NM)	705	56.3
Hyundai Sonata (NM)	12	91.7
Mitsubishi Precis	26	69.2
<u>Pougeot</u>	5	80.0
Subaru Justy (NM)	4	100.0
Suzuki Swift	4	100.0
Toyota Corolla	474	63.7
Toyota Tercel	179	73.7
Volkswagen Fox	18	77.8
Volkswagen Golf	138	90.6
Volkswagen Jetta	432	87.5
Volkswagen Rabbit	321	70.1
Yugo	9	44.4
Total	2,867	65.4

Table 30. Automatic safety belt system comparisons (continued).

Vehicle Manufacturer	Base	Total Percent Restrained
<u>Motorized Shoulder Belt With Belt Disconnect</u>		
Chrysler Conquest	7	85.7
Dodge Monaco	5	100.0
Dodge/Plymouth Colt	199	78.4
Dodge Shadow	92	81.5
Eagle Medallion	10	70.0
Eagle Premier	110	86.4
Eagle Summit	62	95.2
Eagle Talon	19	79.0
Plymouth Laser	61	73.8
Plymouth Sundance	101	69.3
Pontiac LeMans (M)	39	89.7
Acura Integra	246	93.9
Alfa Romeo Spider	2	100.0
Daihatsu Hatchback	14	92.9
Honda Accord (M)	894	94.4
Honda Civic (M)	261	89.7
Hyundai Excel (M)	214	66.8
Hyundai Sonata (M)	36	77.8
Jaguar Total	36	97.2
Mazda Total	699	92.4
Mitsubishi Eclipse	130	87.7
Mitsubishi Galant	93	82.8
Mitsubishi Mirage	170	76.5
Mitsubishi Starion	1	100.0
Nissan 240 SX (M)	213	79.3
Nissan Maxima	1,154	86.4
Nissan Pulsar	7	85.7
Nissan Sentra (M)	221	64.2
Nissan Stanza	124	80.6
Saab 900	38	97.4
Sterling Total	11	100.0
Subaru GL	23	100.0
Subaru Justy (M)	1	0.0
Subaru Legacy	107	93.5
Subaru XT	65	80.0
Volkswagen Corrado	2	100.0
Volkswagen <u>Passat</u>	17	100.0
Total	5,484	86.1

OK
 Lisa
 Passat
 Maximas

Table 30. Automatic safety belt system comparisons (continued).

Vehicle Manufacturer	Base	Total Percent Restrained
<u>Motorized Shoulder Belt Without Belt Disconnect</u>		
Ford Total	5,359	96.9
Mercury Total	809	91.4
Isuzu Impulse	23	91.3
Toyota Camry	3,076	99.0
Toyota Cressida	838	98.9
Total	10,105	97.2
Total All Automatic Vehicle	32,062	78.8

VERIFICATION OF THE AUTOMATIC RESTRAINT VEHICLES DATABASE

A total of 21,950 records for vehicle model years 1987 through 1991 were verified for the Automatic Restraint Study. Additional automatic vehicles were observed prior to the 1987 model year but were not used in this database. Prior to the 1987 law requiring all car manufacturers to equip a certain percentage of their vehicles with passive restraints, only a handful of vehicle models possessed them. These pre-1987 model year vehicles were deleted from this verified database to establish a consistent comparison to previous reports and to the Passenger Vehicle All Restraint Study. Also, the cities of Atlanta and Pittsburgh were not included due to the same reasons stated in the Passenger Vehicle All Restraint Study verified database.

Table 31 shows the percent of drivers utilizing the automatic shoulder restraint by model year and restraint system type. The 2-point motorized system without disconnect had the highest use rate (97.1 percent), compared to the non-motorized 3-point systems rate of 62.6 percent. Overall, 77.7 percent of the drivers in the 17-city automatic verified database utilized their restraint systems. This correlates well to the automatic non-verified data presented earlier in Table 29. Removal of Atlanta and Pittsburgh from the non-verified data base produces a driver restraint use rate of 78.4 percent.

Table 31. Driver shoulder belt use for automatic restraint vehicles by model year and system (verified).

Model Year	Restraint System								Total	
	3-Point Non-Motorized		2-Point Non-Motorized		2-Point Motorized With Disconnect		2-Point Motorized Without Disconnect			
	Base	Percent Restrained	Base	Percent Restrained	Base	Percent Restrained	Base	Percent Restrained	Base	Percent Restrained
1987	723	58.9	208	65.9	266	86.1	1,017	99.0	2,214	81.3
1988	2,104	60.2	400	63.8	441	82.3	1,727	99.0	4,672	76.9
1989	3,046	62.0	269	72.9	915	84.7	2,259	97.2	6,489	77.9
1990	3,547	65.0	619	70.6	2,261	85.6	1,620	94.3	8,047	77.1
1991	284	68.3	25	64.0	78	80.8	141	92.2	528	76.3
Total	9,704	62.6	1,521	68.4	3,961	85.0	6,764	97.1	21,950	77.7

Figure 9 compares verified driver shoulder belt use by automatic restraint system type to driver shoulder belt use of manual systems for model years 1987 through 1991. The data show that every automatic restraint system had a higher use rate than manual systems.

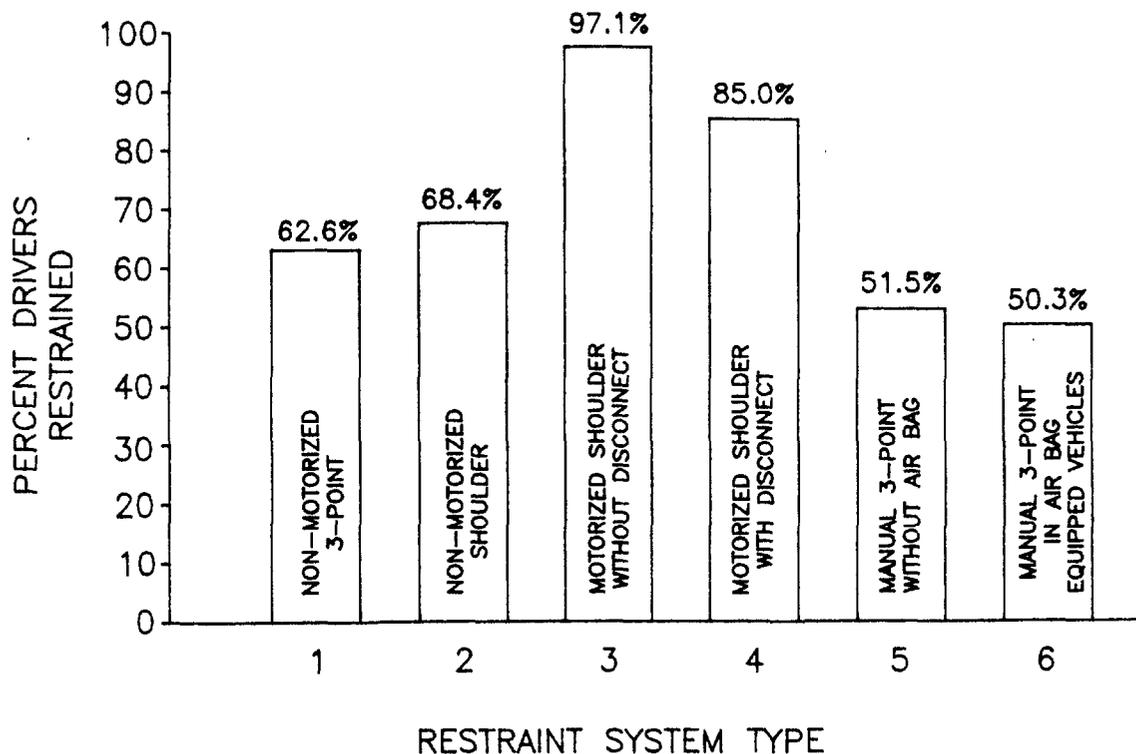


Figure 9. Comparison of automatic restraint systems to manual systems (1987-1991 model year vehicles-verified)

Table 32 shows driver restraint use by restraint type for vehicles manufactured since the 1987 model year (manual and air bag restraint percentages are from the verified database of the All Restraint System Study).

Table 32. Driver shoulder belt use by restraint type (1987-1991 model year vehicles-verified)

Restraint Type	Base	Percent of Shoulder Belt Use
Manual	15,906	51.5
Automatic	21,950	77.7
Air Bag	1,580	50.3

APPENDIX A - DATA FORMS AND PROCEDURES

Driver Study Data Form

Printed data forms entitled "Study 1 - All Safety Belt Systems" will be used in the all passenger vehicle restraint study to identify shoulder belt use for drivers and front-outboard passengers (Figure 10). 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 study period for that city.

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 11/15/90 for November 15, 1990.
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. (Usually color highlighted)
6. **Location No:** Record the number shown on your site listing or map.
7. **Site:** Circle the appropriate description of primary road or freeway exit.
8. **Location:** Write in the street name on which data are collected and the direction (north, east, south, west) and name of the nearest cross-street.
9. **Roadway Conditions:** Circle the condition with best describes the road condition at the time of observation.
10. **Start Time:** Specify the hour and minutes, and circle AM or PM for the start of the collection period.
11. **End Time:** Specify the hour and minutes, and circle AM or PM for the ending of the collection period.

STUDY 1 - ALL SAFETY BELT SYSTEMS

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 _____
 9. Road Condition: Dry Wet Snowy/Icy
 10. Start Time: _____ AM PM 11. End Time: _____ AM PM

No.	License Number	V/ Auto Belt	Make Non-Autic Model Automatic	Make/ Model Code	Driver Data			Driver & Passenger Position by Age Group*			Passenger Data		
					Sex 1. M 2. F	Shoulder Belt Use 1. On 2. Off	Misuse 1. Under Arm 2. Not Back 3. Loose	Driver	Center	Outboard	Sex 1. M 2. F	Shoulder Belt Use 1. On 2. Off	
1.													
2.													
3.													
4.													
5.													
6.													
7.													
8.													
9.													
10.													
11.													
12.													
13.													
14.													
15.													
16.													
17.													
18.													
19.													
20.													

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

Figure 10. Driver study data form.

Observation Data

Complete one line on the form for each vehicle observed. In Study 1, 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" and "Z", "5" and "S", "6" and "G".

2. Automatic Belt System: Place a check mark in the column if the automobile identified make use of an automatic shoulder belting system.

3. 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. If the vehicle is an automatic belt vehicle, include the model name.

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.

4. Make/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 you placed a check mark in column two identifying an automobile with an automatic restraint system, place the appropriate model code for that make and place in next to the 2-digit make/model code.

5. Driver Gender: Write in the code to describe the gender of the driver.

6. Driver Shoulder Belt Use: There are two restraint codes. Place a "1" in the column if the driver is observed using the shoulder harness (correctly or incorrectly). Place a "2" in the column if the shoulder harness is not in use.

7. 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.

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. Watch for slack in the belt behind the back of the front seat on older large 2 door vehicles.

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

Examples:

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

5	////	6	(Front)
////	////	////	(Back)

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

1 = Infant (under 1 yr.) 2 = Toddler (1-4 yrs.) 3 = Subteen (5-12 yrs.) 4 = Teen (13-19 yrs.)

5 = Adult (20-24 yrs.) 6 = Adult (25-49 yrs.) 7 = Adult (50 or over)

9. Front-Outboard Passenger Gender: Write in the code to describe the gender of the front-outboard passenger.

10. Front-Outboard Passenger Shoulder Belt Usage: There are two front-outboard passenger restraint codes. Place a "1" in the column for passengers wearing a shoulder belt, and a "2" in the column if the front-outboard passengers are not wearing a shoulder belt.

Passenger Study Data Form (Study 1)

Printed data forms entitled "Passenger Observations: Shopping Centers" will be used in this study (Figure 11). 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 6 and 7. For item 6, write in the name of the shopping center shown on your list of locations. For item 7, write in the street name onto which the vehicles are exiting. If you change locations, begin a new data form.

Observation Data

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

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

PASSENGER OBSERVATIONS - SHOPPING CENTERS

1. Observer: _____ 2. City: _____
 3. Day: Su M Tu W Th F Sa 4. Date: ____ / ____ / ____
 5. Location No.: _____ 6. Shopping Center: _____
 7. Exit To: _____
 8. Start Time: _____ AM / PM 9. End Time: _____ AM / PM

No.	Total Passengers	Age Group*	Seat		Position		Restraint Use		Correct Child Seat Use	
			1. Front 2. Back 3. Rear	1. Driver Side 2. Center 3. Outboard	1. Shoulder Belt 2. Lap Only 3. Infant/ Toddler Seat 4. Booster Seat 5. None 6. None - Unused Child Seat 7. Dr. Lg.	1. Correct 2. Incorrect 3. Infant Wrong Direction				
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-Susteen (5-12) 4-Teenager (13-19) 5-Adult (20-24) 6-Adult (25-49) 7-Adult (50 or over)

Figure 11. Passenger study data form.

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

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

Shoulder Belt (Code 1)

This means that a positive observation has been made 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 5 if the passenger is not belted. You will never use Code 1 if the car contains only a lap belt.

Infant/Toddler Safety Seat (Code 3)

Infant-only 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-only 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-only safety seat is the same. The 5-point system includes a pair of straps that fit over the infants shoulders, lap belts and a crotch strap. Note that no infant-only safety seats are designed to face forward.

Toddler safety seats are generally designed for small children between the ages of 1-4 years old. Toddler seats face forward and some have a five-point harness system (straps) to secure the toddler to the seat. Most 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 early models have a tether strap which is to be attached to the rear safety belt or deck lid to prevent pivoting (tipping forward). There are also convertible safety seats which can be used for toddlers or can be used in the infant position (rearward facing).

Booster Seats (Code 4)

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.

None (Code 5)

If the passenger is not wearing either the lap belt, shoulder harness or not placed in a safety seat, record Code 5.

None/Unused Child Seat (Code 6)

If an infant or toddler is observed not using a child safety seat and one or more child seats are present in the vehicle, then for each child that could be occupying a safety seat, record Code 6.

Child on Lap (Code 7)

If an infant, toddler or subteen is observed being held in the arms of another passenger use a code 7 signifying child on lap. Do not use a code 7 for the adult holding the child, instead use code 1, 2 or 5 depending on the adults restraint usage.

6. **Correct Child 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 indicates that an infant or child is being transported in a NHTSA approved infant-only (Code 3) or booster (Code 4) safety seat.

Infant-Only Seat

This column should only be used when an infant-only safety seat is being used (Code 3 for restraint use).

Correct (Code 1)

Use this code if the infant or toddler is restrained correctly in the child safety seat.

Incorrect (Code 2)

If the infant or toddler is not restrained properly in a child safety seat, use Code 2.

Infant Wrong Direction (Code 3)

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

Special Study Data Form (Study 1)

Printed data forms entitled "Special Toddler Seat Study - Toddler Seat Only" will be used in study 1 (Figure 12). 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.

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 7, "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 toddler safety seat observed. If a vehicle has two child safety seats in it, two lines of data will be coded for the observation.

1. Frame Type: Write in the proper code identifying the toddler seat frame type.

Molded Plastic (Code 1):

Use this code if the toddler seat and seat base is totally made out of molded plastic.

Metal Type (Code 2):

Use this code if any part of the seat or base incorporates the use of metal tubing.

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

SPECIAL TODDLER SEAT STUDY

(Toddler Seat Only)

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 Condition: Dry Wet Snowy/Icy
 9. Start Time: _____ AM PM 10. End Time: _____ AM PM

No.	Frame Type	Beltline Attached to Seat	Tether (if Required)	Make/Model/Comments
	1. Molded Plastic 2. Metal Tube	1. Correct 2. Incorrect 3. No	1. Used 2. Not used	
1.				
2.				
3.				
4.				
5.				
6.				
7.				
8.				
9.				
10.				
11.				
12.				
13.				
14.				
15.				
16.				
17.				
18.				
19.				
20.				

Figure 12. Child safety seat study data form.

Correct (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.

Incorrect (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 use 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. This observation would receive a Code 3.

3. **Tether (If Required):** This column is for toddler seats that require the secure attaching of a tether strap.

Used (Code 1)

Write this code if the observed toddler seat is one that requires the use of a tether and that tether strap is being used.

Not Used (Code 2)

Write this code if the toddler seat is identified as requiring the use of a tether strap but that strap is not being used.

4. **Make/Model:** Write in the brand name make and model of the identified toddler seat. Model names can usually be read directly off of seat, if not, consult your child safety identification guide as to the correct seat being observed.

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 (Study 1 and Study 2)

Printed data forms entitled "Motorcycle/Moped Observation: Form #3" will be used in both study 1 and study 2 (Figure 13). 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 moped or motorbike.

MOTORCYCLE - MOPED OBSERVATION: FORM #2

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.			
14.			
15.			
16.			
17.			
18.			
19.			
20.			
21.			
22.			
23.			
24.			
25.			

Figure 13. Helmet study data form.

Automatic Safety Belt Data Form

Printed data forms entitled "Study 2 - Automatic Belts Only" will be used in the automatic passenger vehicle restraint study to identify safety belt use for drivers and front-outboard passengers (Figure 14). 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 study period for that city.

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 11/15/90 for November 15, 1990.
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. (Usually color highlighted)
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.

STUDY 2 - AUTOMATIC BELTS ONLY

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 _____
 9. Road Condition: Dry Wet Snowy/Icy
 10. Start Time: _____ AM PM 11. End Time: _____ AM PM

No.	Licence Number	Model	Make Code	Driver Data			Driver & Passenger Position by Age Group*			Passenger Data	
				Sex 1. M 2. F	Automatic Belt Use 1. Shldr. & Lap 2. Shldr. Only 3. None 4. Shldr. (No See Lap) 5. None (No See Lap)	Misuse 1. Under arm 2. Behind back 3. Loose	Driver	Center	Outboard	Sex 1. M 2. F	Automatic Belt Use 1. Shldr. & Lap 2. Shldr. Only 3. None 4. Shldr. (No See Lap) 5. None (No See Lap)
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-Subtler (5-12) 4-Teenager (13-19) 5-Adult (20-24) 6-Adult (25-49) 7-Adult (50 or over)

Figure 14. Automatic safety belt data form.

Observation Data

Complete one line on the form for each automatic restraint vehicle observed. In Study 2, start with the second car stopped for the traffic light. Obtain additional observations during the red light if time permits. If only one car stops at the light and it is an automatic restraint vehicle, 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" and "Z", "5" and "S", "6" and "G".

2. **Model:** We are interested in the specific model of the vehicle. 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 you will have to settle for the general car make (domestic or foreign). Where possible, we prefer a specific make category.

3. **Make Code:** At the end of the observation period or day, for each make name recorded, insert the appropriate two-digit make and model identification code in the space provided. You will be provided with a list of model names and codes to assist you in the coding task.

4. **Driver Gender:** Write in the code to describe the gender of the driver.

5. **Driver Shoulder Belt Use:** There are five restraint codes, as follows:

Shoulder and Lap (Code 1)

Place a "1" in the space provided if positive identification of the shoulder and lap belt are in use.

Shoulder Only (Code 2)

Place a "2" in the space provided if only the shoulder belt is being used and the lap belt is positively identified not being used.

None (Code 3)

Place a "3" in the space provided if the safety belt system is not being used.

Shoulder, No See Lap (Code 4)

Place a "4" in the space provided if the shoulder belt is being used but identification of lap belt use is not positive (for appropriate vehicles).

None, No See Lap (Code 5)

Place a "5" in the space provided if the shoulder belt is not being used but identification of lap belt use is not positive (for appropriate vehicles).

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.

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

Examples:

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

5	/ / / / / / / /	6	(Front)
/ / / / / / / /	/ / / / / / / /	/ / / / / / / /	(Back)

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

1 = Infant (under 1 yr.) 2 = Toddler (1-4 yrs.) 3 = Subteen (5-12 yrs.) 4 = Teen (13-19 yrs.)

5 = Adult (20-24 yrs.) 6 = Adult (25-49 yrs.) 7 = Adult (50 or over)

8. Front-Outboard Passenger Gender: Write in the code to describe the gender of the front-outboard passenger.

9. Front-Outboard Passenger Shoulder Belt Usage: There are five restraint codes. These five codes are identical to the driver shoulder belt codes.