

1. Report No. DOT HS 808 148	2. Government Accession No.	3. Recipient's Catalog No.	
4. Title and Subtitle Restraint System Use in 19 U.S. Cities 1991 Annual Report		5. Report Date March 1992	6. Performing Organization Code
7. Author(s) Tapan K. Datta, Ph.D., P.E. and Paul Guzek		8. Performing Organization Report No.	
9. Performing Organization Name and Address Goodell-Grivas, Inc. 17320 W. Eight Mile Road Southfield, MI 48075		10. Work Unit No. (TRNS)	11. Contract or Grant No. DTNH22-89-C-07034
12. Sponsoring Agency Name and Address U.S. Dept. of Transportation National Highway Traffic Safety Admin. 400 7th. Street, S.W. Washington, D.C. 20590		13. Type of Report and Period Covered 1991 Annual Report	
15. Supplementary Notes NHTSA Contract Manager - Robert Schweitz, NRD-41		14. Sponsoring Agency Code	
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 1991. A total of 256,907 observations of automobile drivers indicated an overall driver safety belt use rate of 51.1 percent. The driver safety belt use rate in areas that have mandatory use laws was 60.9 percent for female drivers and 47.6 percent for male drivers. Whereas in areas with no use laws, driver safety belt use rate was 45.2 percent for female drivers and 30.7 percent for male drivers.</p> <p>The shopping center observation indicated that 70.2 percent of the infants, 73.6 percent of the toddlers, 41.8 percent of the subteens, 22.9 percent of the teens and 40.5 percent of the adult passengers were restrained. Child safety seats were observed being used for 87.0 percent of the infant and 81.8 percent of the toddler passengers. Correct toddler safety seat installation was recorded at a rate of 85.9 percent. In areas with motorcycle helmet use laws 99.5 percent of the operators and 98.1 percent of the passengers used helmets. Helmet use in areas with no helmet use laws was 39.6 percent for operators and 27.7 percent for passengers.</p> <p>Automobiles equipped with automatic belt systems had an overall driver belt use rate of 80.1 percent. The motorized shoulder belt system that could not be disconnected displayed the highest use rate of 96.6 percent. The lowest automatic system use rate of 63.5 percent was observed from the 3-point non-motorized system.</p>			
17. Key Words Safety belts, seat belts, child safety seats, motorcycle helmet use, automatic restraint systems.		18. Distribution Statement This document is available to the U.S. public through the National Technical Information Service, Springfield, VA 22161	
19. Security Classif. (of this report) Unclassified	20. Security Classif. (of this page) Unclassified	21. No. of Pages 76	22. Price

Table of Contents

	<u>Page</u>
SUMMARY.....	1
Driver Observation Findings.....	1
Shopping Center Observation Findings.....	3
Toddler Safety Seat Installation.....	4
Motorcycle and Moped Helmet Study Findings.....	5
Observations of Passive Restraint Systems.....	5
INTRODUCTION.....	6
Project Objective.....	6
Project Description.....	6
Study 1.....	6
Study 2.....	7
Study Methodology.....	8
Data Collection Sites.....	8
Data Collection Scenario.....	8
Data Forms and Procedures.....	11
Training Procedures.....	12
Quality Control.....	12
Analysis of 1991 Results.....	12
SUMMARY OF THE PASSENGER VEHICLE ALL RESTRAINT STUDY.....	14
Driver and Front-Outboard Passenger Shoulder Belt Use by City....	14
Driver Shoulder Belt Use by Age and Sex.....	16
Driver Shoulder Belt Use by Site Characteristics.....	17
Shoulder Belt Use by Vehicle Manufacturer.....	18
Driver Safety Belt Misuse.....	19
Shoulder Belt Misuse by Vehicle Manufacturer.....	20
VERIFICATION OF THE PASSENGER VEHICLE ALL RESTRAINT SYSTEM DATABASE.	21
SHOPPING CENTER OBSERVATION FINDINGS.....	25
Infants (Under 1 Year).....	26
Toddlers (Ages 1 to 4 Years).....	29
Subteens (Ages 5 to 12 Years).....	32
Teens (Ages 13 to 19 Years) - Excluding Drivers.....	34
Teens (Ages 13 to 19 Years) - Drivers Only.....	36
Adults (Ages 20 and Older) - Excluding Drivers.....	37
Adults (Ages 20 and Older) - Drivers Only.....	39

Table of Contents (Continued)

	<u>Page</u>
OBSERVATIONS OF TODDLER SAFETY SEAT INSTALLATION.....	40
MOTORCYCLE/MOPED OBSERVATION FINDINGS.....	46
OBSERVATIONS ON CARS WITH AUTOMATIC SAFETY BELTS.....	49
VERIFICATION OF THE AUTOMATIC RESTRAINT VEHICLE DATABASE.....	55
APPENDIX A - DATA FORMS AND PROCEDURES.....	59

List of Figures

	<u>Page</u>
Figure 1. Driver shoulder belt use over the last five years.....	2
Figure 2. Infant and toddler safety seat use over time.....	3
Figure 3. Correct toddler safety seat installation trend.....	4
Figure 4. Motorcycle helmet use trend for operators.....	5
Figure 5. Location of the 19 cities for restraint use observation.....	9
Figure 6. Trend of passenger restraint system use.....	25
Figure 7. Motorcycle helmet use trend for operators by the existence of mandatory helmet use law.....	46
Figure 8. Driver seat belt use by selected vehicle manufacturers (Automatic Restraint System Study).....	50
Figure 9. Comparison of automatic restraint systems to manual systems (1987-1992 model year vehicles-verified).....	57
Figure 10. Driver study data form.....	61
Figure 11. Shopping center study data form.....	67
Figure 12. Toddler safety seat study data form.....	72
Figure 13. Helmet study data form.....	76

List of Tables

	<u>Page</u>
Table 1. Driver and passenger shoulder belt use.....	15
Table 2. Female driver - shoulder belt use by age.....	16
Table 3. Male driver - shoulder belt use by age.....	16
Table 4. Driver shoulder belt use by site type.....	17
Table 5. Driver shoulder belt use by area type.....	17
Table 6. Driver shoulder belt use by vehicle manufacturer.....	18
Table 7. Driver shoulder belt misuse by sex and age.....	19
Table 8. Driver shoulder belt misuse by vehicle manufacturer.....	20
Table 9. Driver shoulder belt use by model year (verified).....	22
Table 10. Driver shoulder belt use by vehicle size and type (verified).....	23
Table 11. Driver shoulder belt misuse by model year (verified).....	24
Table 12. Methods of restraining infants.....	26
Table 13. Infants restrained by safety seats by city.....	27
Table 14. Safety seat use for infants by seat position.....	28
Table 15. Methods of restraining toddlers.....	29
Table 16. Restraint system use by city for toddlers.....	30
Table 17. Safety seat use for toddlers by seat position.....	31
Table 18. Safety belt use by city for subteen passengers.....	32
Table 19. Passenger safety belt use for subteens by seat position....	33
Table 20. Passenger safety belt use for teens by city (excluding drivers).....	34
Table 21. Passenger safety belt use for teens by seat position.....	35
Table 22. Safety belt use for teens by city (drivers only).....	36

List of Tables (Continued)

	<u>Page</u>
Table 23. Passenger safety belt use for adults by city (excluding drivers).....	37
Table 24. Passenger safety belt use for adults by seat position.....	38
Table 25. Safety belt use for adults by city (drivers only).....	39
Table 26. Types of toddler safety seats and percent correctly fastened.....	41
Table 27. Toddler seat with belt only and with belt and tether strap.	44
Table 28. Toddler seat belt installation.....	45
Table 29. Motorcycle helmet use in 1991.....	47
Table 30. Moped helmet use in 1991.....	48
Table 31. Driver shoulder belt use for automatic vehicles.....	50
Table 32. Automatic safety belt system comparisons.....	52
Table 33. Driver shoulder belt use for automatic restraint vehicles by model year and system (verified).....	56
Table 34. Driver shoulder belt use by restraint type (1987-1992 model year vehicles-verified).....	58

SUMMARY

Four 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 drivers and 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 1991.

Driver Observation Findings

This study was conducted continuously during the 1991 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 256,907 observations of drivers stopped at traffic signals on major arterial streets and freeway exit ramp locations:

- Driver shoulder belt use increased to 51.1 percent in 1991 (Figure 1). The percent use of shoulder belt systems for 1987 and 1988 were recalculated from the historical database to allow the comparison with 1989, 1990, and 1991 data.
- Female driver shoulder belt use was higher than male driver use (59.0 percent versus 45.6 percent).
- Driver shoulder belt use was found to be the highest among the 50 and older age group and lowest among the under 20 age category (52.0 percent versus 44.5 percent).
- Drivers were observed to use shoulder belts more often on expressways than on primary roads (56.6 percent versus 49.0 percent).
- Drivers of imported vehicles were more apt to use shoulder belts than drivers of domestic vehicles (60.4 percent versus 46.3 percent).

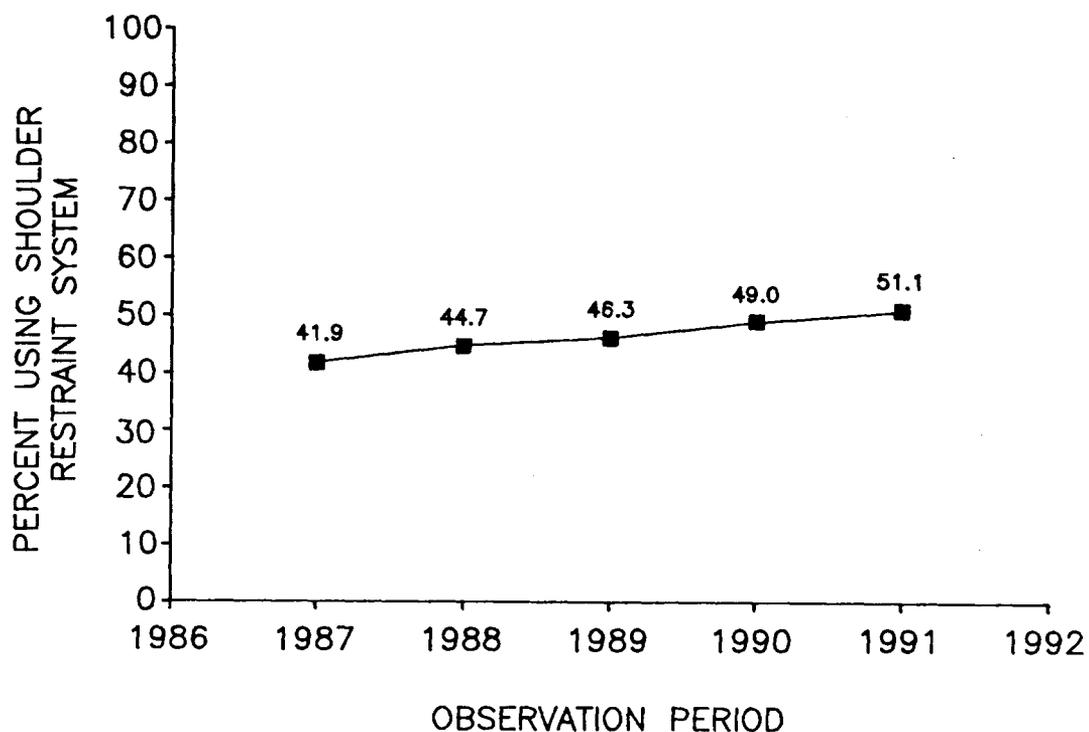


Figure 1. Driver shoulder belt use over the past five years.

The following major findings are based on shoulder belt misuse of the 256,907 driver observations in 1991.

- Approximately 2.6 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 (3.6 percent versus 2.0 percent).

Shopping Center Observation Findings

This study, conducted in the first and third quarters of 1991, consisted of determining safety belt use among drivers and passengers entering/exiting designated shopping centers in each of the 19 cities.

A total of 85,105 person-observations (driver plus passenger) were recorded during the 1991 calendar year. The following are the major findings:

- 82.5 percent of the infants and toddlers were observed to be restrained in child safety seats during 1991 (Figure 2).
- Subteens (5 to 12-year olds) were observed to be secured by safety seats or seat belts 41.8 percent of the time.

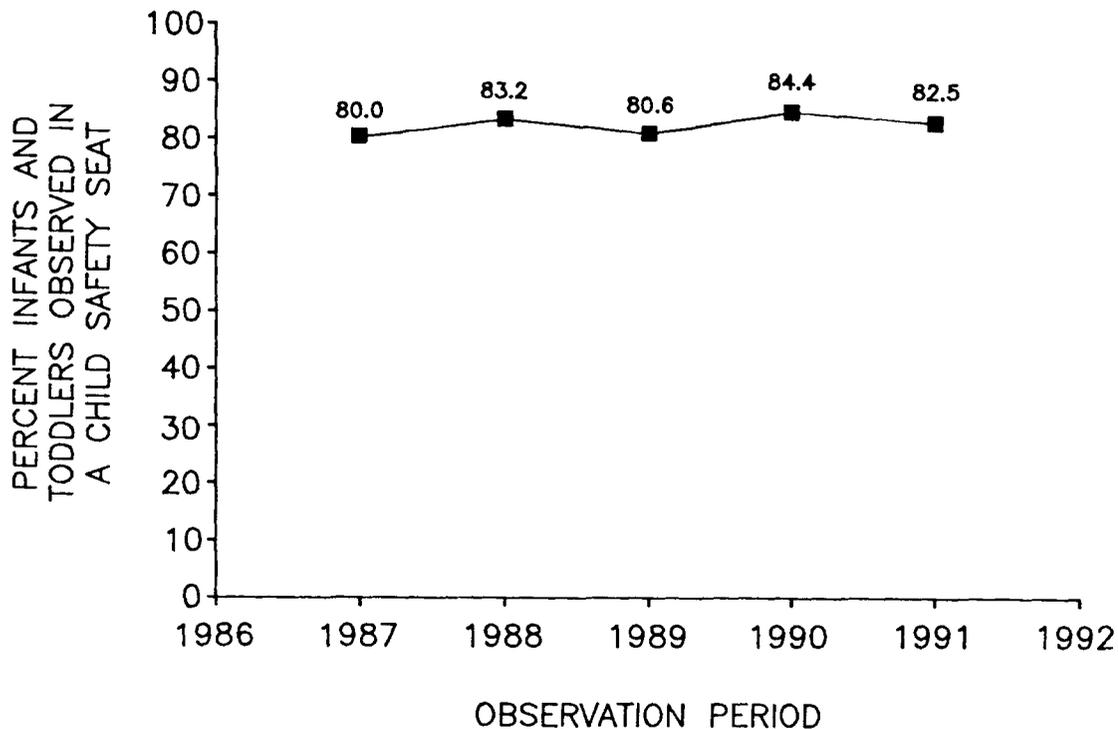


Figure 2. Infant and toddler safety seat use over time.

Toddler Safety Seat Installation

A total of 3,606 toddler safety seats were observed in parked vehicles at shopping malls as a part of this study. Of the 3,606 toddler seats observed, 3,552 required installation only by seat belt, the remaining 54 or 1.5 percent required installation by safety belt and a tether strap. The toddler seats, that required securing by seat belt, 87.2 percent were observed to be correctly installed, whereas, toddler seats requiring a tether strap were observed to be correctly installed only in 1.9 percent of the vehicles. Figure 3 displays correct toddler safety seat installation percentages for the past five years.

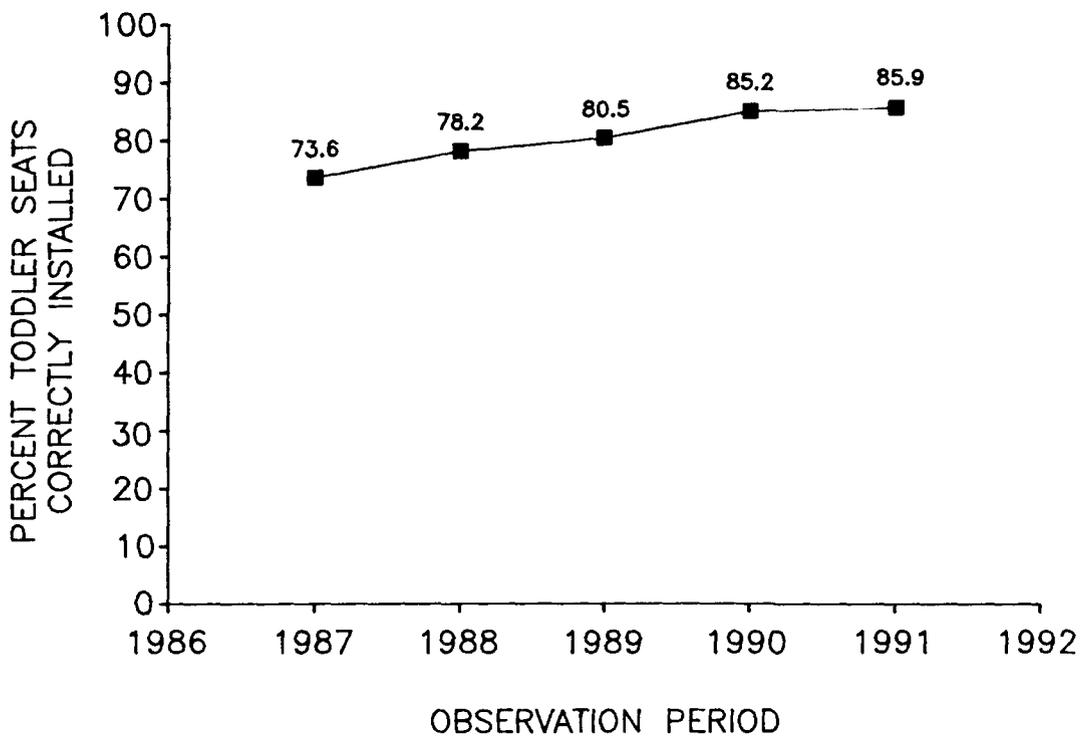


Figure 3. Correct toddler safety seat installation trend.

Motorcycle and Moped Helmet Study Findings

Motorcycle helmet use for operators and passengers were observed to be 58.0 percent and 48.0 percent, respectively, in 1991, based on 10,656 observations. In cities with a mandatory helmet use law, operator helmet use was observed to be 99.5 percent, whereas in cities with no or limited helmet use laws, only 39.6 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 880 observations. Helmet use for mopeds was 45.6 percent for the operators and 27.8 percent for the passengers.

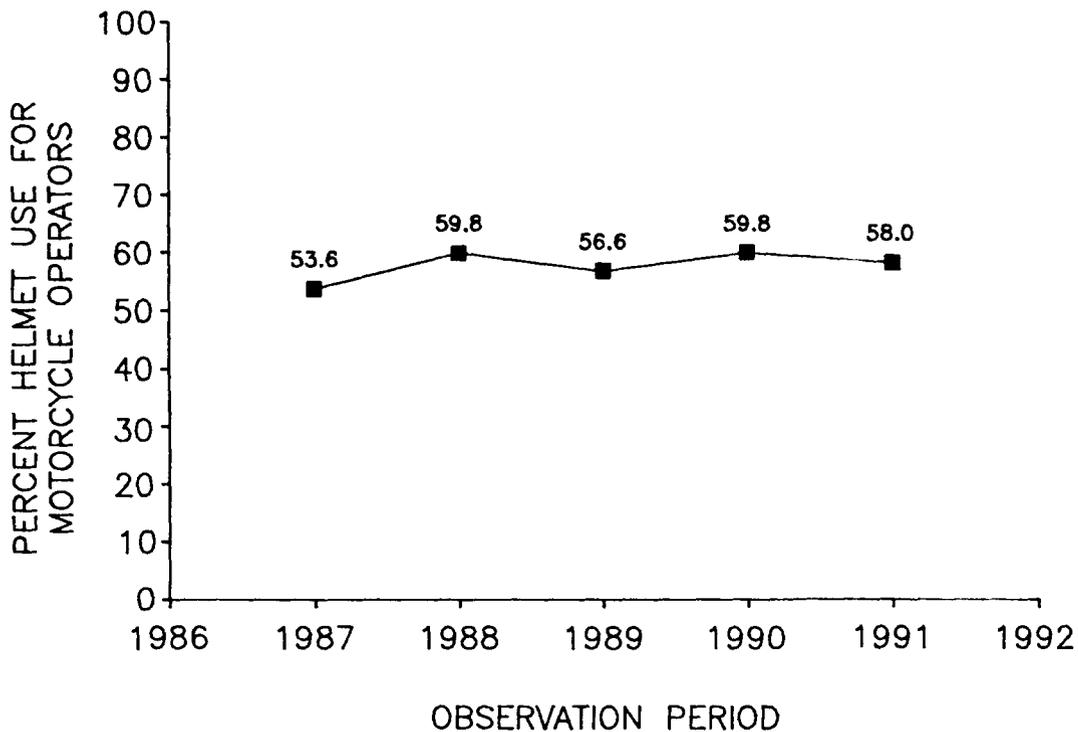


Figure 4. Motorcycle helmet use trend for operators.

Observations of Passive Restraint Systems

The 1991 study included 35,814 observations of vehicles with automatic safety belts. Analysis of these vehicles indicate that overall driver restraint use is 80.1 percent. Drivers identified in vehicles with motorized shoulder belt systems without a belt disconnect displayed the highest restraint use at 96.6 percent opposed to vehicles possessing non-motorized three-point systems at 63.5 percent.

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 over 250,000 passenger vehicles and approximately 11,000 motorcycle and moped observations.

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 1991 project consisted of a data collection effort that has been divided into four separate studies. Study 1 consisted of collecting data on: a) driver and front-outboard passenger shoulder belt use and driver shoulder belt misuse; b) driver and passenger safety belt use and child safety seat use; c) correct installation of toddler safety seats; and d) motorcycle and moped operator and passenger helmet use. Study 2 obtained driver and front-outboard passenger shoulder belt use and driver misuse along with motorcycle and moped helmet use data. Each study is described below.

Study 1

This study was conducted during the first and third quarters of 1991. 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 front-outboard passenger.
- Gender of driver and passenger.
- Observed driver shoulder belt use.
- Observed driver shoulder belt misuse.
- Shoulder belt use of front-outboard passenger.

● Shopping Center Restraint Study

The purpose of this study was to monitor the use of occupant restraint systems by drivers and passengers of private passenger vehicles. This data was collected at entrances/exits of selected shopping malls. 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 proper/improper installation characteristics 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 selected shopping centers 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 helmet use by operators and passengers of motorcycles and mopeds observed on the roadways.

Study 2

This study was conducted during the second and fourth quarters of 1991, and it consisted of:

● Passenger Vehicle All Restraint Study

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

● 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

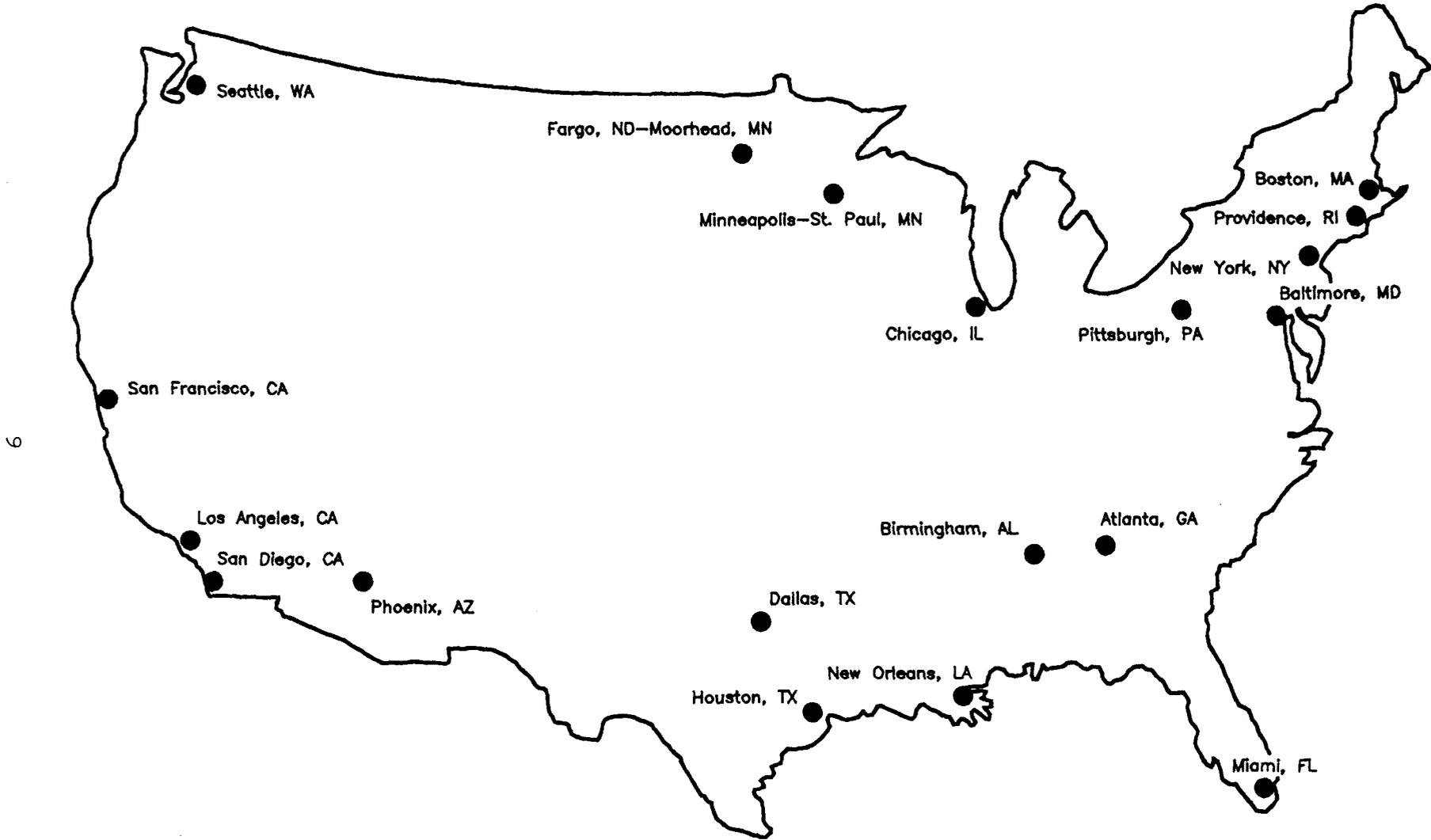


Figure 5. Location of the 19 cities for restraint use observation.

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 and front-outboard passenger information studies (70 percent arterial and 30 percent freeway exit) within each city. In addition, study 1 required 3 shopping center study locations within each city. The malls were selected 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 Passenger Vehicle All Restraint Study, 6 days for the Shopping Center Restraint Study, and 4 hours for the Toddler Safety Seat Installation Study. The Helmet Study was conducted 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 and front-outboard passenger observations of study 1 required 1 hour at each of 6 sites per day. Shopping center observations required 6 hours per day at a single shopping mall during its hours of operation. The driver and front-outboard observations were usually conducted on Monday through Thursday and the shopping center observations on Friday through Sunday. Motorcycle and moped observations were conducted each day during both study 1 and study 2.

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 driver and front-outboard observations. 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 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. Observers were only responsible for observing the cars in the curb lane.

Shopping center 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 this study.

Only non-commercial passenger cars, station wagons, and mini vans were eligible for the shopping center study. 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 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 pre-determined peak parking demand periods.

Helmet use observations of motorcycle/moped operator(s) and passenger(s) 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.

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 (1990 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 at the observers first city. 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 5 to 6 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 1991 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 1991 report to facilitate comparison of results and identification of trends which may have been present in the 19 cities.

The 1991 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 the Passenger Vehicle All Restraint Study and the Helmet Use Study. 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, the only changes in this year's project were to the Shopping Center Restraint Study. Prior to 1991, only passengers (excluding the driver) in vehicles with a child under the age of thirteen were observed at selected malls. In the first quarter cycle of 1991, the vehicle did not have to contain a child under the age of thirteen to be observed. In the third quarter, drivers and passengers of any vehicle exiting or entering the shopping malls were eligible.

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 1991 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 1991 survey two states passed laws mandating seat belt usage for motorists. The cities of Birmingham, Alabama and Providence, Rhode Island were affected by this law after the second quarter collection period. At the end of our survey year, 17 of 19 cities had MUL's and are designated as such with an asterisk. 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 1991 ranged from a high of 70.6 percent in Dallas to a low of 28.1 percent in Providence, with an overall shoulder belt use rate for drivers of 51.1 percent. Front-outboard passenger (not including infants and toddlers) use rates ranged from a high of 66.0 percent in Seattle to a low of 23.9 percent in Providence, with an overall shoulder belt use rate for front-outboard passengers of 44.8 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*	12,608	46.5	2,717	35.3
Baltimore*	12,514	59.7	2,808	51.0
Birmingham* ¹	13,655	37.5	3,620	30.8
Boston	14,335	35.0	2,783	29.0
Chicago*	14,067	34.0	3,102	28.7
Dallas*	14,323	70.6	3,203	63.7
Fargo/Moorhead	10,159	43.4	2,135	41.8
Houston*	14,443	61.8	3,368	52.0
Los Angeles*	14,178	59.4	2,885	50.8
Miami*	14,057	44.5	3,427	38.5
Minneapolis/St. Paul*	13,816	60.8	3,071	54.0
New Orleans*	13,126	39.7	2,989	33.5
New York*	13,905	34.7	4,062	32.5
Phoenix	14,097	66.6	3,013	54.9
Pittsburgh*	13,103	50.0	3,378	45.6
Providence* ²	13,104	28.1	3,052	23.9
San Diego*	14,218	63.7	3,545	59.4
San Francisco*	13,623	63.2	3,189	59.0
Seattle*	13,576	67.9	3,212	66.0
MUL Cities	219,326	53.7	51,061	47.0
Non-MUL Cities	37,581	36.3	8,498	31.4
Total	256,907	51.1	59,559	44.8

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

1 - MUL City beginning July 18, 1991 (after second quarter).

2 - MUL City beginning June 20, 1991 (after second quarter).

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 59.0 percent of female drivers utilized shoulder belts as compared to 45.6 percent of male drivers.

The shoulder belt use summary tables are also subdivided by age groups. The female age group of 50 or older displayed the highest seat belt use rate among all groups at 61.6 percent. The seat belt use rate for males was highest in the 50 or older age group at 47.0 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	356	55.1	62	29.0	418	51.2
20 - 24	10,808	56.5	1,848	39.8	12,656	54.1
25 - 49	65,007	60.9	8,595	47.5	73,602	59.3
50 or Older	16,872	64.2	2,131	41.5	19,003	61.6
Total	93,043	60.9	12,636	45.2	105,679	59.0

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	857	44.2	116	22.4	973	41.6
20 - 24	14,450	43.4	2,107	27.7	16,557	41.4
25 - 49	86,180	47.6	11,552	32.0	97,732	45.8
50 or Older	31,418	48.6	4,548	29.0	35,966	47.0
Total	132,905	47.6	18,323	30.7	151,228	45.6

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 (56.6 percent) than for drivers at other locations (49.0 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 suburban areas use shoulder belts at a slightly higher rate than drivers in the city, 51.8 percent versus 50.9 percent.

Table 4. Driver shoulder belt use by site type.

Site Type	Base	Percent Restrained
Primary Road	186,843	49.0
Freeway Exit	70,064	56.6
Total	256,907	51.1

Table 5. Driver shoulder belt use by area type.

Area Type	Base	Percent Restrained
City	187,706	50.9
Suburb	69,201	51.8
Total	256,907	51.1

Shoulder Belt Use by Vehicle Manufacturer

Driver shoulder belt use by vehicle manufacturer with more than 4,000 observations is presented in Table 6. Drivers of Volvo vehicles were wearing safety belts in 66.3 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, 60.4 percent versus 46.3 percent, respectively.

Table 6. Driver shoulder belt use by vehicle manufacturer.

Vehicle Manufacturer	Base	Percent Restrained
Chrysler	25,907	48.6
Ford	45,054	51.1
General Motors	98,868	43.5
Datsun/Nissan	14,064	53.6
Honda	15,170	66.2
Mazda	4,854	62.9
Toyota	21,161	65.4
Volkswagen	5,091	58.3
Volvo	4,279	66.3
Other Imports	22,459	55.0
Domestic Total	169,829	46.3
Import Total	87,078	60.4
Total	256,907	51.1

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 in previous tables 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 1991 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 2.6 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	418	1.7	0.0	1.2	2.9
20 - 24	12,656	2.6	0.2	1.0	3.8
25 - 49	73,602	2.0	0.1	1.0	3.2
50 or Older	19,003	2.6	0.2	2.3	5.1
Subtotal	105,679	2.2	0.2	1.3	3.6
<u>Male</u>					
Under 20	973	0.6	0.2	0.5	1.3
20 - 24	16,557	1.0	0.2	0.6	1.7
25 - 49	97,732	0.8	0.1	0.8	1.7
50 or Older	35,966	1.3	0.1	1.4	2.8
Subtotal	151,228	1.0	0.1	0.9	2.0
Total	256,907	1.5	0.1	1.0	2.6

Shoulder Belt Misuse by Vehicle Manufacturer

Driver shoulder belt misuse by vehicle manufacturer with more than 4,000 observations 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 3.1 percent to 1.7 percent. The highest rate of the observed misuse was in Ford vehicles, 3.4 percent, and the least was in Mazda vehicles, 1.4 percent.

Table 8. Driver shoulder belt misuse by vehicle manufacturer.

Vehicle Manufacturer	Base	Percent Misuse			Total Percent Misused
		Under Arm	Behind Back	Loose	
Chrysler	25,907	1.2	0.1	0.8	2.1
Ford	45,054	1.8	0.3	1.3	3.4
General Motors	98,868	1.4	0.1	1.7	3.2
Datsun/Nissan	14,064	1.4	0.1	0.2	1.7
Honda	15,170	1.5	0.1	0.2	1.8
Mazda	4,854	1.2	0.1	0.1	1.4
Toyota	21,161	1.4	0.2	0.2	1.9
Volkswagen	5,091	1.4	0.2	0.2	1.8
Volvo	4,279	1.9	0.0	0.3	2.2
Other Imports	22,459	1.2	0.1	0.2	1.5
Domestic Total	169,829	1.5	0.1	1.5	3.1
Import Total	87,078	1.4	0.1	0.2	1.7
Total	256,907	1.5	0.1	1.0	2.6

VERIFICATION OF THE PASSENGER VEHICLE ALL RESTRAINT SYSTEM DATABASE

The field observers noted license plate numbers during their field surveys for the Passenger Vehicle All Restraint Study. 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 cities of Birmingham, Fargo/Moorhead, New Orleans, New York, and Seattle could only be used in the verified database due to time constraints. A total of 47,357 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 62,017 vehicles observed in the five cities. 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.

The three tables contained in this section identify only 18 percent of the total number of vehicles observed in the Passenger Vehicle All Restraint Study. Caution should be used when drawing conclusions from these tables because of the limited number of verified data, although, they typify patterns found in past reports.

Table 9 shows an overall driver shoulder belt use rate of 46.8 percent for the 5 cities whose data were processed by the Vindicator Program. If only the five cities are identified from the 19-city non-verified database (Table 1), the overall driver shoulder belt use rate would be 44.7 percent, closely approximating 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	31	9.7
1968	37	10.8
1969	39	28.2
1970	70	18.6
1971	77	26.0
1972	106	17.0
1973	174	16.7
1974	251	26.7
1975	277	28.2
1976	589	23.6
1977	859	24.4
1978	1,224	29.4
1979	1,539	30.1
1980	1,612	32.9
1981	2,132	34.5
1982	2,144	36.8
1983	2,454	39.4
1984	3,760	41.4
1985	4,264	43.8
1986	4,650	47.0
1987	4,663	50.8
1988	4,774	52.5
1989	4,628	56.6
1990	4,025	65.5
1991	2,815	66.7
1992	163	56.4
Total	47,357	46.8

Table 10 shows verified driver shoulder belt use rate as a function of vehicle size and type. Drivers of imported vehicles had a 59.0 percent belt use rate as compared to 41.0 percent for drivers of 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.	47.9% (7,097)	54.1% (9,615)	51.5% (16,712)
Compact 101 in. < WB \leq 110 in.	41.6% (14,619)	70.0% (4,867)	48.7% (19,486)
Midsize 111 in. < WB \leq 120 in.	37.6% (9,099)	51.1% (521)	38.3% (9,620)
Full Size WB > 120 in.	23.0% (1,408)	41.7% (120)	24.5% (1,528)
No Data	25.0% (8)	66.7% (3)	36.4% (11)
Total	41.0% (32,231)	59.0% (15,126)	46.8% (47,357)

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, 2.6 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	31	0.0	3.2	0.0	3.2
1968	37	0.0	0.0	0.0	0.0
1969	39	2.6	0.0	0.0	2.6
1970	70	4.3	0.0	0.0	4.3
1971	77	1.3	0.0	0.0	1.3
1972	106	0.0	0.0	0.0	0.0
1973	174	0.6	0.0	0.6	1.2
1974	251	1.2	0.0	1.2	2.4
1975	277	1.1	0.7	1.4	3.2
1976	589	1.5	0.2	1.4	3.1
1977	859	0.5	0.1	1.4	2.0
1978	1,224	1.1	0.2	1.1	2.4
1979	1,539	1.1	0.1	1.2	2.3
1980	1,612	1.0	0.1	1.3	2.4
1981	2,132	1.5	0.0	0.6	2.1
1982	2,144	1.4	0.0	0.7	2.1
1983	2,454	1.7	0.0	0.8	2.5
1984	3,760	1.2	0.0	1.0	2.2
1985	4,264	1.5	0.1	1.2	2.9
1986	4,650	2.1	0.1	0.9	3.0
1987	4,663	1.9	0.1	1.0	3.0
1988	4,774	1.9	0.1	1.2	3.2
1989	4,628	1.9	0.2	1.1	3.2
1990	4,025	1.5	0.0	0.6	2.2
1991	2,815	1.2	0.2	0.3	1.7
1992	163	2.5	0.0	1.2	3.7
Total	47,357	1.6	0.1	0.9	2.6

SHOPPING CENTER OBSERVATION FINDINGS

During 1991, a total of 26,491 drivers and 58,614 passengers were observed during the Shopping Center Restraint Study. Two sets of data are contained within this section. One database includes only the driver restraint use of adults and teens collected in the third quarter. The other database includes only the passenger restraint use of the vehicles observed. This second database provides us with a comparison between this year's data and data obtained in the earlier study years. All passenger vehicles entering or exiting were included in the sample.

Part of 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 1991, infants were found to be correctly restrained in infant seats 70.2 percent, toddlers to be correctly restrained in toddler seats 73.6 percent, subteens restrained by booster seat or safety belt 41.8 percent, teens and adults restrained by safety belt 22.9 and 40.5 percent, respectively (drivers excluded from this sample base).

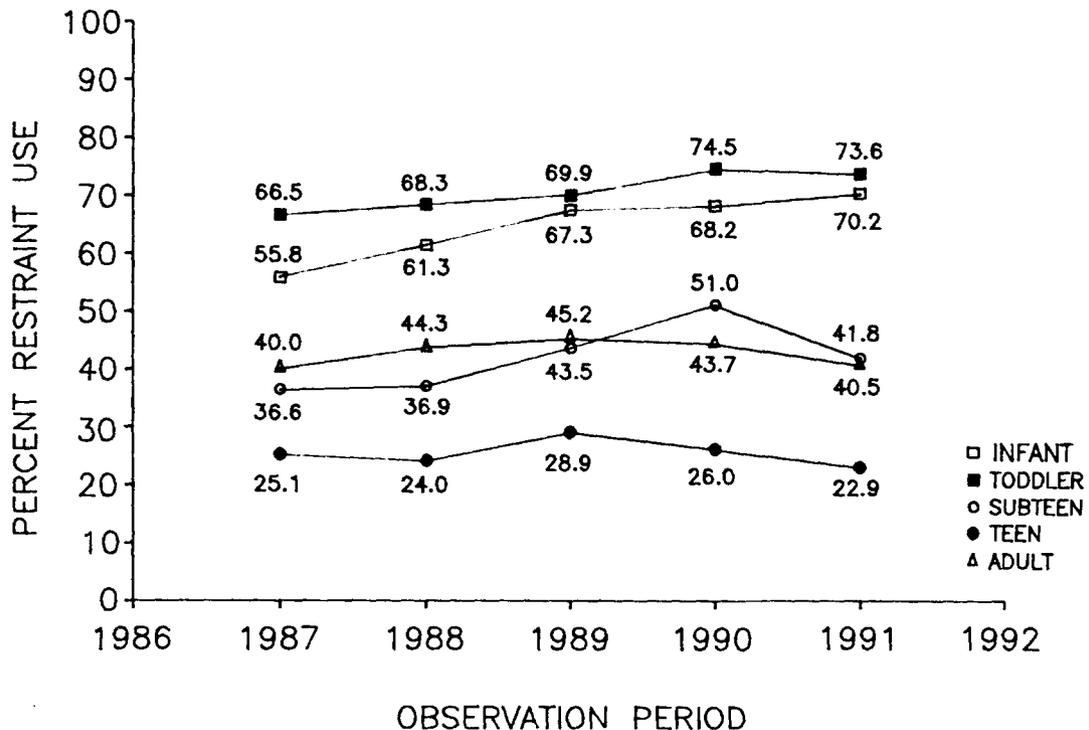


Figure 6. Trend of passenger restraint system use.

Infants (Under 1 Year)

A total of 894 infants were observed during the shopping center observation study. Of this sample, 87.0 percent were observed in infant safety seats. Of the 87.0 percent observed in infant seats, 70.2 percent were properly restrained, 6.6 percent were incorrectly restrained, and 10.2 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>	778	87.0
Correctly Restrained	628	70.2
Incorrectly Restrained	59	6.6
Wrong Direction	91	10.2
Safety Belt	17	1.9
On Lap	71	7.9
None	21	2.3
Undetermined	7	0.8
Total	894	

Use of child safety seats in the sample of 894 observations are further subdivided by city in Table 13. Data from the city of Minneapolis/St. Paul shows that infants were observed in a child safety seat 95.7 percent of the time and were properly restrained 87.0 percent, highest among the 19 cities. The lowest use of infants being properly restrained was found in Fargo/Moorhead at a rate of 50.0 percent.

Table 13. Infants restrained by safety seats by city.

City	Base	Percent in Safety Seat	Percent Properly Restrained in Safety Seat
Atlanta	61	86.9	67.2
Baltimore	45	95.6	82.2
Birmingham	41	82.9	70.7
Boston	52	92.3	84.6
Chicago	54	87.0	75.9
Dallas	50	88.0	72.0
Fargo/Moorhead	20	80.0	50.0
Houston	48	87.5	72.9
Los Angeles	41	92.7	61.0
Miami	53	71.7	54.7
Minneapolis/St. Paul	46	95.7	87.0
New Orleans	46	84.8	47.8
New York	46	84.8	73.9
Phoenix	44	84.1	63.6
Pittsburgh	39	92.3	74.4
Providence	42	90.5	76.2
San Diego	57	91.2	75.4
San Francisco	57	78.9	59.6
Seattle	52	86.5	75.0
Total Sample and Average of Total Sample	894	87.0	70.2

Table 14 presents infant safety seat use by seating position. Infants were most commonly transported in the front-outboard passenger position and had the highest 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	20	100.0	65.0
Front Seat - Outboard	422	86.0	76.8
Total Front Seat	442	86.7	76.2
Back Seat - Driver	109	90.8	62.4
Back Seat - Center	139	94.2	66.9
Back Seat - Outboard	184	88.0	69.0
Total Back Seat	432	90.7	66.7
Rear (for station wagons, hatchbacks and minivans)	20	15.0	15.0
Total	894	87.0	70.2

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 5,569 toddlers were observed during the shopping center study. Table 15 shows that 80.4 percent were in toddler seats and 1.4 percent were in booster seats. Of the toddlers not observed in safety seats, 8.9 percent were unrestrained in another passenger's lap, 5.6 percent were observed using no restraint, and 2.8 percent were restrained by a safety belt.

Table 15. Methods of restraining toddlers.

Type of Restraint	Base	Percent
<u>Safety Seat</u>		
Toddler Seat	4,477	80.4
Booster Seat	80	1.4
<u>Unrestrained</u>		
On Lap	498	8.9
No Restraint	312	5.6
Safety Belt	157	2.8
Undetermined	45	0.8
Total	5,569	

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

- 95.0 percent of the 1.4 percent using booster seats were correctly restrained.
- Of the 80.4 percent in toddler seats, 91.6 percent were correctly restrained. New Orleans and San Diego data showed a 98.3 percent (highest of 19 cities) correct use rate and the New York sample showed a 82.0 percent (lowest of 19 cities) correct use rate.
- 81.8 percent of the toddlers were observed in a booster or toddler seat and 91.6 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 Belt	(J) Percent of Col. (B) Not Re- strained or Un- determined
Atlanta	261	1.5	100.0	70.9	93.0	72.4	93.1	1.5	26.1
Baltimore	463	2.4	100.0	84.9	95.2	87.3	95.3	5.0	7.8
Birmingham	283	1.4	100.0	76.0	91.6	77.9	91.8	3.2	19.4
Boston	308	0.0	--	94.5	90.4	94.5	90.4	1.3	4.2
Chicago	338	0.6	0.0	78.4	94.0	79.0	93.3	2.1	18.9
Dallas	281	0.0	--	78.3	88.2	78.3	88.2	1.4	20.3
Fargo/Moorhead	179	0.6	100.0	76.5	86.9	77.1	87.0	1.7	21.2
Houston	302	1.3	100.0	75.2	90.7	76.5	90.9	3.0	20.5
Los Angeles	267	1.5	100.0	74.9	89.5	76.4	89.7	1.5	22.1
Miami	330	1.5	100.0	80.6	94.7	82.1	93.0	1.8	16.1
Minn./St. Paul	253	0.0	--	92.5	90.6	92.5	90.6	1.2	6.3
New Orleans	180	1.1	50.0	66.7	98.3	67.8	97.5	5.6	26.7
New York	262	0.0	--	84.7	82.0	84.7	82.0	0.8	14.5
Phoenix	263	2.3	100.0	73.4	92.2	75.7	92.5	5.3	19.0
Pittsburgh	270	1.9	100.0	87.8	89.9	89.6	90.1	4.4	5.9
Providence	347	4.9	94.1	78.7	88.2	83.6	88.3	2.3	14.1
San Diego	343	0.9	100.0	86.0	98.3	86.9	98.3	4.1	9.0
San Francisco	292	0.0	--	74.7	91.3	74.7	91.3	4.1	21.2
Seattle	347	3.5	100.0	82.4	92.0	85.9	92.3	2.9	11.2
Total	5,569	1.4	95.0	80.4	91.6	81.8	91.6	2.8	15.3

- 2.8 percent of the toddlers were restrained by a safety belt.
- 14.5 percent of the total sample of 5,569 toddlers observed were not restrained and 0.8 percent undetermined.

The relationship between seating position and safety seat/belt use is summarized in Table 17. Toddlers were observed most often in the back seat outboard position and restrained properly by a child safety seat in 92.1 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 - Driver	8	0.0	0.0	0.0	0.0	0.0
Front Seat - Center	87	3.4	31.0	1.1	32.2	85.7
Front Seat - Outboard	926	5.4	48.6	1.4	50.0	87.9
Total Front Seat	1,021	5.2	46.7	1.4	48.1	87.8
Back Seat - Driver	1,286	1.7	87.9	1.6	89.6	91.8
Back Seat - Center	1,365	1.0	89.3	1.7	91.0	92.5
Back Seat - Outboard	1,833	3.4	87.6	1.1	88.7	92.1
Total Back Seat	4,484	2.2	88.2	1.4	89.7	92.1
Rear (for station wagons, hatchbacks and minivans)	64	10.9	70.3	1.6	71.9	89.1
Total	5,569	2.8	80.4	1.4	81.8	91.6

Subteens (Ages 5 to 12 Years)

Table 18 indicates a total of 15,617 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 39.8 percent in 1991. Another 2.0 percent of the sample were restrained in safety seats; resulting in a total of 41.8 percent of the subteen passengers being restrained.

Minneapolis/St. Paul had the highest restraint use rates, 60.8 percent using safety belts and 3.8 percent in safety seats; New Orleans had the lowest, 22.0 percent and 1.0 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	Percent Undetermined
Atlanta	856	1.5	31.2	66.5	0.8
Baltimore	934	1.4	53.8	41.5	3.3
Birmingham	846	1.8	33.6	61.2	3.4
Boston	600	3.1	60.7	34.5	1.7
Chicago	914	1.1	37.2	52.3	9.4
Dallas	732	2.9	44.4	50.1	2.6
Fargo/Moorhead	817	0.5	25.2	64.6	9.7
Houston	912	1.8	43.8	53.5	0.9
Los Angeles	951	0.6	26.9	68.1	4.3
Miami	834	1.3	40.2	57.3	1.2
Minn./St. Paul	762	3.8	60.8	32.9	2.5
New Orleans	682	1.0	22.0	72.3	4.7
New York	692	3.9	38.6	50.6	6.9
Phoenix	782	1.5	39.9	51.3	7.3
Pittsburgh	840	2.9	47.7	46.1	3.3
Providence	755	3.3	31.8	57.5	7.4
San Diego	922	1.2	43.9	52.9	2.0
San Francisco	922	2.5	30.7	54.2	12.6
Seattle	864	3.5	47.3	38.1	11.1
Total	15,617	2.0	39.8	53.2	5.1

Table 19 presents restraint use by seating position for subteen passengers. In 1991, a total of 5,510 subteens were identified in the front seat outboard position. They were restrained 63.7 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 - Driver	6	0.0
Front Seat - Center	398	10.8
Front Seat - Outboard	5,510	63.7
Total Front Seat	5,914	60.1
Back Seat - Driver	3,261	36.6
Back Seat - Center	2,540	16.5
Back Seat - Outboard	3,338	38.8
Total Back Seat	9,139	31.9
Rear (for station wagons, hatchbacks and minivans)	564	11.5
Total	15,617	41.8

Teens (Ages 13 to 19 Years) - Excluding Drivers

Table 20 contains data on the 8,131 teenage passengers observed in front-outboard and rear seating positions during the 1991 19-city passenger study. Overall, safety belt use was 22.9 percent, lowest of all age categories, down from 26.0 percent in 1990. Teen restraint use ranged from a high of 36.5 percent in Dallas to a low of 13.5 percent in Fargo/Moorhead.

Table 20. Passenger safety belt use for teens by city (excluding drivers).

City	Base	Percent Restrained	Percent Not Restrained	Percent Undetermined
Atlanta	450	23.3	74.0	2.7
Baltimore	425	35.8	60.5	3.8
Birmingham	377	18.8	78.8	2.4
Boston	379	19.8	78.1	2.1
Chicago	539	17.4	73.8	8.7
Dallas	285	36.5	61.1	2.5
Fargo/Moorhead	639	13.5	80.4	6.1
Houston	562	24.6	69.2	6.2
Los Angeles	354	22.0	76.0	2.0
Miami	382	24.3	73.6	2.1
Minneapolis/St. Paul	527	29.8	64.5	5.7
New Orleans	355	17.7	74.6	7.6
New York	281	15.7	80.8	3.6
Phoenix	390	22.6	71.8	5.6
Pittsburgh	432	25.2	71.1	3.7
Providence	379	14.8	82.8	2.4
San Diego	430	29.8	69.1	1.2
San Francisco	443	19.9	71.6	8.6
Seattle	502	26.5	65.1	8.4
Total	8,131	22.9	72.3	4.8

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 47.1 percent of the cases.

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

Seat Position	Base	Percent Restrained
Front Seat - Center	88	9.1
Front Seat - Outboard	2,734	47.1
Total Front Seat	2,822	45.9
Back Seat - Driver	1,776	13.6
Back Seat - Center	920	1.7
Back Seat - Outboard	2,426	12.4
Total Back Seat	5,122	10.9
Rear (for station wagons, hatchbacks and minivans)	187	3.7
Total	8,131	22.9

Teens (Ages 13 to 19 Years) - Drivers Only

Table 22 contains data on the 419 teenage drivers observed in the 1991 19-city Shopping Center Study. Overall, safety belt use was 45.8 percent compared to 44.5 percent in the Passenger Vehicle All Restraint Study.

Table 22. Safety belt use for teens by city (drivers only).

City	Base	Percent Restrained	Percent Not Restrained	Percent Undetermined
Atlanta	17	47.1	52.9	0.0
Baltimore	11	63.6	36.4	0.0
Birmingham	24	33.3	66.7	0.0
Boston	20	5.0	95.0	0.0
Chicago	7	14.3	85.7	0.0
Dallas	68	67.6	32.4	0.0
Fargo/Moorhead	45	35.6	64.4	0.0
Houston	20	80.0	20.0	0.0
Los Angeles	24	50.0	50.0	0.0
Miami	8	37.5	62.5	0.0
Minneapolis/St. Paul	16	50.0	50.0	0.0
New Orleans	25	28.0	72.0	0.0
New York	15	20.0	80.0	0.0
Phoenix	25	52.0	48.0	0.0
Pittsburgh	29	27.6	72.4	0.0
Providence	14	7.1	92.9	0.0
San Diego	5	60.0	40.0	0.0
San Francisco	13	61.5	38.5	0.0
Seattle	33	70.0	30.0	0.0
Total	419	45.8	54.2	0.0

Adults (Ages 20 and Older) - Excluding Drivers

A total of 28,403 adult passengers (excluding drivers) were observed in the shopping center study in 1991. Restraint system use among all adult passengers was found to be 40.5 percent. Analysis of the data in Table 23 shows that the highest use rate (54.2 percent) was in Dallas and the lowest use rate (25.1 percent) was in Providence. In 1990, adults in San Diego has the highest restraint use rate (55.1 percent) and Providence had the lowest use rate (32.0 percent).

Table 23. Passenger safety belt use for adults by city (excluding drivers).

City	Base	Percent Restrained	Percent Not Restrained	Percent Undetermined
Atlanta	1,770	37.7	60.3	2.0
Baltimore	1,325	46.1	51.0	2.9
Birmingham	1,413	32.2	67.1	0.7
Boston	1,487	32.2	66.0	1.7
Chicago	1,402	34.6	61.1	4.4
Dallas	1,171	54.2	43.6	2.1
Fargo/Moorhead	1,879	32.9	64.5	2.6
Houston	1,831	45.8	52.4	1.7
Los Angeles	1,446	38.0	59.8	2.1
Miami	1,612	38.0	60.4	1.6
Minneapolis/St. Paul	1,392	49.9	48.3	1.8
New Orleans	1,076	28.3	67.9	3.8
New York	1,248	31.2	67.7	1.1
Phoenix	1,598	46.6	50.4	3.0
Pittsburgh	1,851	42.6	54.7	2.6
Providence	1,193	25.1	74.3	0.6
San Diego	1,840	49.4	48.4	2.2
San Francisco	1,469	46.5	48.1	5.4
Seattle	1,400	52.9	43.1	4.0
Total	28,403	40.5	57.1	2.4

Adult passengers were observed most often in the front outboard seating position and were restrained in 52.4 percent of the observations. Table 24 contains the supporting data. Adult passengers observed traveling in the back seat of these vehicles were restrained only 7.0 percent of the time.

Table 24. Passenger safety belt use for adults by seat position.

Seat Position	Base	Percent Restrained
Front Seat - Center	108	12.0
Front Seat - Outboard	20,943	52.4
Total Front Seat	21,051	52.2
Back Seat - Driver	2,451	7.5
Back Seat - Center	888	0.8
Back Seat - Outboard	3,926	8.1
Total Back Seat	7,265	7.0
Rear (for station wagons, hatchbacks and minivans)	87	9.2
Total	28,403	40.5

Adults (Ages 20 and Older) - Drivers Only

A total of 26,072 adult drivers were observed in the Shopping Center Study in 1991. Restraint system use among this group was found to be 58.6 percent, compared to 51.1 percent in the Passenger Vehicle All Restraint Study.

Table 25. Safety belt use for adults by city (drivers only).

City	Base	Percent Restrained	Percent Undetermined
Atlanta	1,191	57.2	0.0
Baltimore	1,422	70.3	0.0
Birmingham	1,551	50.1	0.0
Boston	1,589	39.3	0.0
Chicago	1,434	44.1	0.0
Dallas	1,541	72.9	0.0
Fargo/Moorhead	1,229	43.0	0.0
Houston	1,170	66.4	0.0
Los Angeles	1,457	61.4	0.0
Miami	1,340	56.2	0.0
Minneapolis/St. Paul	1,495	66.4	0.0
New Orleans	1,040	48.8	0.0
New York	1,265	47.5	0.0
Phoenix	1,407	74.8	0.0
Pittsburgh	1,215	56.8	0.0
Providence	1,452	29.5	0.0
San Diego	1,263	72.8	0.0
San Francisco	1,421	76.0	0.0
Seattle	1,590	76.3	0.0
Total	26,072	58.6	0.0

OBSERVATIONS OF TODDLER SAFETY SEAT INSTALLATION

Shopping center observations were made from curb locations near the entrance/exit points of selected 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 Shopping Center Restraint 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, 3,606 toddler safety seats were observed in parked vehicles at the same shopping malls. Table 26 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.

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 13.9 percent in 1991. Vehicles with automatic safety belts are relatively easy to spot due to the position of the shoulder belt. To help observers spot an automatic safety belt vehicle they were given a list of vehicles that possess an automatic restraint system.

During the Passenger Vehicle All Restraint System Study, information on 35,814 vehicles with automatic safety belts was collected. Table 31 identifies driver restraint use stratified by city and mandatory seat belt use law (MUL). Overall, driver shoulder belt use was observed in 80.1 percent of the vehicles. In cities where a mandatory restraint use law was in effect, 81.7 percent of the drivers utilized their shoulder belt as opposed to 70.5 percent of the drivers in non-MUL cities, an 11.2 percentage point difference.

Table 31. Driver shoulder belt use for automatic vehicles.

City	Driver Shoulder Belt Use	
	Base	Percent Restrained
Atlanta*	1,672	81.6
Baltimore*	2,423	85.6
Birmingham* ¹	1,993	76.9
Boston	2,060	70.4
Chicago*	2,140	67.3
Dallas*	1,890	91.9
Fargo/Moorhead	1,335	71.9
Houston*	1,780	87.8
Los Angeles*	1,506	87.9
Miami*	1,826	78.1
Minneapolis/St. Paul*	2,012	83.7
New Orleans*	1,891	73.4
New York*	2,014	72.9
Phoenix	1,900	86.5
Pittsburgh*	2,172	75.9
Providence* ²	1,754	64.4
San Diego*	2,054	88.8
San Francisco*	1,704	88.4
Seattle*	1,688	90.0
MUL Cities	30,614	81.7
Non-MUL Cities	5,200	70.5
Total	35,814	80.1

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

1 - MUL City beginning July 18, 1991 (after second quarter).

2 - MUL City beginning June 20, 1991 (after second quarter).

Figure 8 contains driver use of automatic seat belts by selected vehicle manufacturers. The highest use rate (95.4 percent) was observed in Mazda vehicles; and the lowest use rate (63.3 percent) was observed in General Motor vehicles.

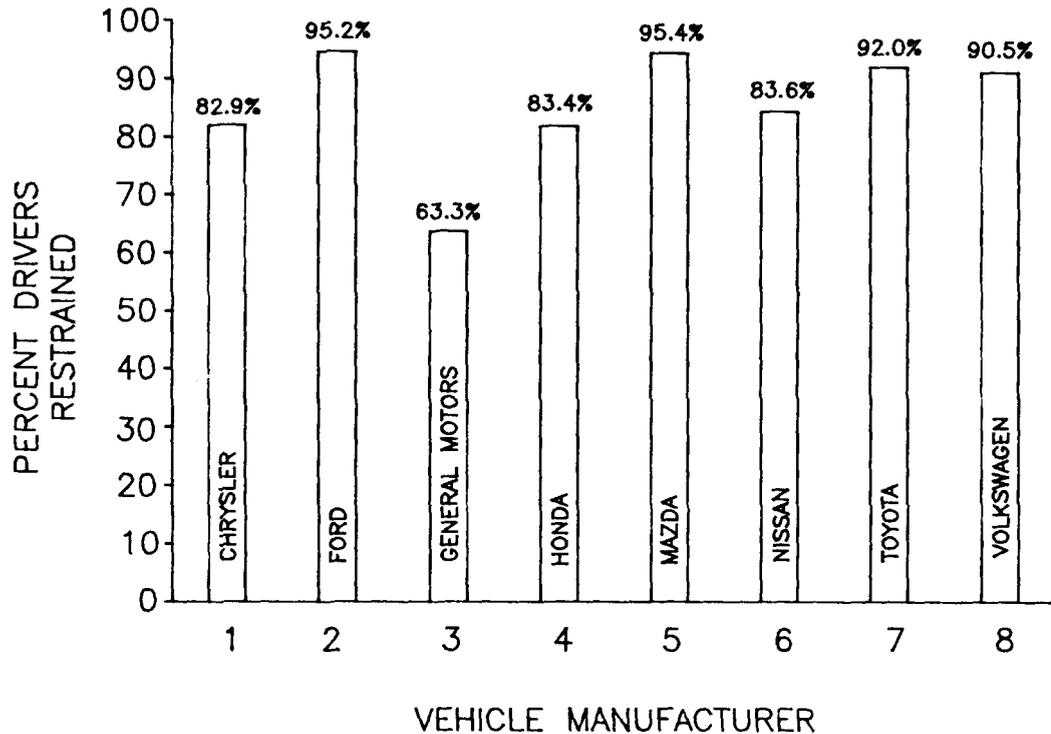


Figure 8. Driver seat belt use by selected vehicle manufacturers (Automatic Restraint System Study).

The data in Table 32 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 32. Automatic safety belt system comparisons.

Vehicle Manufacturer	Base	Total Percent Restrained
<u>Non-Motorized Three-Point Belt System Shoulder & Lap</u>		
Buick Total	2,728	65.5
Cadillac Brougham	89	53.9
Chevrolet Total (Except Geo Prizm Models)	3,852	61.4
Oldsmobile Total	2,584	65.6
Pontiac Total (Except LeMans Models)	3,371	61.4
Honda Accord (NM)	524	66.8
Honda Civic (NM)	360	74.2
Honda CRX	136	65.4
Honda Prelude	413	64.9
Nissan 240 SX (NM)	17	47.1
Nissan 300 ZX	3	100.0
Nissan Axxes	15	93.3
Nissan Sentra (NM)	187	54.0
Total	14,279	63.5
<u>Non-Motorized Shoulder Belt System</u>		
Chevrolet Geo Prizm	277	68.6
Chrysler LeBaron	160	60.0
Dodge Daytona	70	48.6
Pontiac LeMans (NM)	16	75.0
Daihatsu Charade Sedan	7	85.7
Daihatsu CLS	8	87.5
Hyundai Excel (NM)	345	55.9
Hyundai Sonata (NM)	13	92.3
Mitsubishi Precis	21	76.2
Pougeot	8	75.0
Subaru Justy (NM)	8	87.5
Suzuki Swift	10	90.0
Toyota Corolla	1,094	70.8
Toyota Paseo	3	66.7
Toyota Tercel	372	75.3
Volkswagen Fox	47	87.2
Volkswagen Golf	131	93.9
Volkswagen Jetta	460	95.2
Volkswagen Rabbit	159	75.5
Yugo	11	63.6
Total	3,220	73.7

Table 32. Automatic safety belt system comparisons (continued).

Vehicle Manufacturer	Base	Total Percent Restrained
<u>Motorized Shoulder Belt With Belt Disconnect</u>		
Chrysler Conquest	1	100.0
Dodge Monaco	21	85.7
Dodge/Plymouth Colt	166	89.8
Dodge Shadow	75	76.0
Eagle Medallion	11	100.0
Eagle Premier	72	87.5
Eagle Summit	59	93.2
Eagle Talon	51	92.2
Plymouth Laser	73	87.7
Plymouth Sundance	72	83.3
Pontiac LeMans (M)	55	87.3
Acura Integra	342	94.4
Daihatsu Hatchback	17	76.5
Honda Accord (M)	1,627	94.4
Honda Civic (M)	568	93.7
Hyundai Excel (M)	428	78.0
Hyundai Scoupe	26	84.6
Hyundai Sonata (M)	102	91.2
Infinity G20	22	95.5
Jaguar Total	54	90.7
Mazda Total	797	95.4
Mitsubishi Eclipse	149	88.6
Mitsubishi Galant	141	92.9
Mitsubishi Mirage	183	92.9
Mitsubishi Starion	3	100.0
Nissan 240 SX (M)	174	86.2
Nissan Maxima	1,145	88.8
Nissan Pulsar	1	100.0
Nissan Sentra (M)	362	76.2
Nissan Stanza	237	92.8
Saab 900	46	91.3
Sterling Total	15	100.0
Subaru GL	26	88.5
Subaru Justy (M)	2	50.0
Subaru Legacy	158	94.9
Subaru Loyale	7	85.7
Subaru XT	54	92.6
Volkswagen Corrado	6	83.3
Volkswagen GTI	7	100.0
Volkswagen Passet	42	88.1
Total	7,397	90.5

Table 32. Automatic safety belt system comparisons (continued).

Vehicle Manufacturer	Base	Total Percent Restrained
<u>Motorized Shoulder Belt Without Belt Disconnect</u>		
Ford Total	5,643	95.8
Mercury Total	925	91.5
Saturn Total	19	94.7
Isuzu Impulse	11	90.9
Toyota Camry	3,329	98.7
Toyota Cressida	991	99.0
Total	10,918	96.6
Total All Automatic Vehicle	35,814	80.1

VERIFICATION OF THE AUTOMATIC RESTRAINT VEHICLES DATABASE

A total of 6,564 records for vehicle model years 1987 through 1992 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 Birmingham, Fargo/Moorhead, New Orleans, New York, and Seattle were the only cities included due to time constraints. Again, caution should be used when drawing conclusions about the tables in this section due to the limited number of verified data.

Table 33 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 system rate of 56.7 percent. Overall, 77.2 percent of the drivers in the 5-city automatic verified database utilized their restraint systems. This correlates well to the automatic non-verified data presented earlier in Table 29. Separating the five cities above from the total non-verified database would produce a driver restraint use, in these five cities, of 77.0 percent.

Table 33. 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	142	58.5	40	62.5	68	83.8	221	97.7	471	80.9
1988	447	54.6	54	72.2	105	87.6	359	98.1	965	75.3
1989	628	57.0	42	64.3	186	85.5	438	97.7	1,294	75.1
1990	937	54.9	239	70.7	710	91.5	470	97.0	2,356	75.9
1991	498	61.2	111	79.3	480	92.9	350	95.4	1,439	81.5
1992	24	58.3	3	0.0	3	100.0	9	88.9	39	64.1
Total	2,676	56.7	489	71.2	1,552	90.7	1,847	97.1	6,564	77.2

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 1992. The data show that every automatic restraint system had a higher use rate than manual systems.

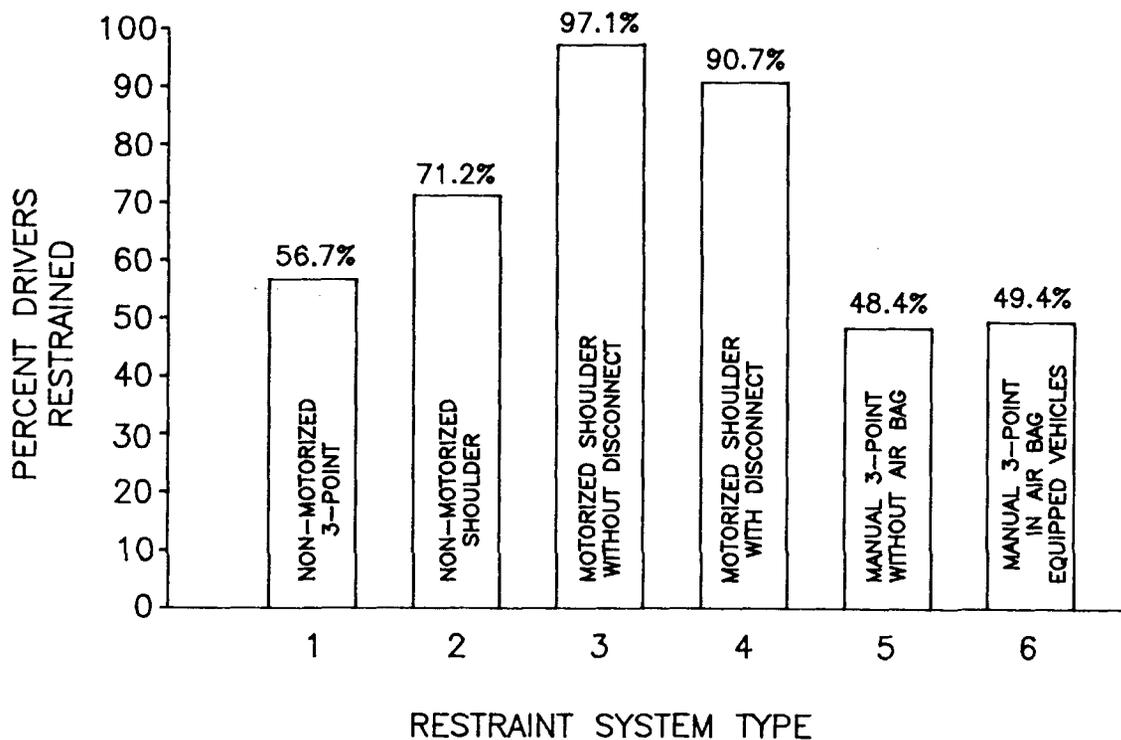


Figure 9. Comparison of automatic restraint systems to manual systems (1987-1992 model year vehicles-verified)

Table 34 shows driver restraint use by restraint type for vehicles manufactured since the 1987 model year.

Table 34. Driver shoulder belt use by restraint type
(1987-1992 model year vehicles-verified)

Restraint Type	Base	Percent of Shoulder Belt Use
Manual	12,053	48.4
Automatic	6,564	77.2
Air Bag	2,451	49.4

APPENDIX A - DATA FORMS AND PROCEDURES

Driver Study Data Form (Study 1 and Study 2)

Printed data forms entitled "All Vehicle Restraint Study" will be used in both study 1 and study 2 to identify safety 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 11/15/91 for November 15, 1991.
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.

ALL VEHICLE RESTRAINT STUDY

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 DN: _____ 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	A u t o	Make/ Model	Make/ Model Code	Driver Data			Driver & Passenger Position By Age Group			Passenger Data	
					Sex 1. M 2. F	Belt Use 1. Shldr. & Lap 2. Shldr Only 3. None 4. Shldr (No See Lap) 5. Lap Only	Misuse 1. Under Arm 2. Behind Back 3. Loose	Driver	Center	Outboard	Sex 1. M 2. F	Belt Use 1. Shldr. & Lap 2. Shldr Only 3. None 4. Shldr (No See Lap) 5. Lap Only
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 vehicle stops at the light, observe that vehicle.

1. License Number: The license numbers of the vehicles 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 is equipped with 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, Nova, 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 Safety Belt Use: Place one of the five possible driver safety belt restraint codes in the column. The five driver belt use codes are:

Shoulder and Lap (Code 1)

Use Code 1 when both the shoulder and lap belts are in use by the driver.

Shoulder Only (Code 2)

This code identifies that only the shoulder belt is being utilized and the lap belt is not. Code 2 can be used only for automobiles with automatic belt systems.

None (Code 3)

The driver is not using the shoulder or lap belt system.

Shoulder Use, Lap Unknown (Code 4)

Code 4 identifies that the driver is using the shoulder belt but use of the lap belt is unknown. This code can only be marked if the vehicle has an automatic belt system.

Lap Only (Code 5)

This code is used when the driver is utilizing the lap belt only. This code can only be used in vehicles with automatic restraint systems.

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)
in front seat:

<u>Driver</u>	<u>Center</u>	<u>Out- board</u>
5	////// //////	6

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 five codes available for the passenger belt use. These five codes are the same codes as identified in the driver safety belt use category.

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, four lines will be coded for the observation.

1. License Plate: Write the license plate number of the vehicle being observed.
2. Total Passengers: Write total number of passengers in the car, including the driver. This is only recorded once for each vehicle when recording data for the first passenger in the vehicle.
3. 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.

PASSENGER OBSERVATIONS - SHOPPING CENTERS

1. Observer: _____ 2. City: _____

3. Day: Su M Tu W Th F Sa 4. Date: _____

5. Shopping Center: _____ 6. Location No. _____

7. Exit To: _____

8. Start Time: _____ A.M. P.M. 9. End Time: _____ A.M. P.M.

No.	License Plate	Total Passengers	Age Group	Seat	Position	Restraint Use	Child Seat Use
				1. Front 2. Back 3. Rear	1. Driver Side 2. Center 3. Outboard	1. Shoulder 2. Lap Belt Only 3. Inf./Tod. Seat 4. Booster Seat 5. None 6. None - Unused Seat 7. On Lap 8. Undetermined	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-Subteen (5-12 yrs) 4-Teenager (13-19yrs) 5-Adult (20-24yrs) 6-Adult (25-49yrs) 7-Adult (50 or over)

Figure 11. Passenger study data form.

4. 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.

5. 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.

6. 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.

Undetermined (Code 8)

Use this code if you are unable to clearly identify the restraint use for that passenger.

7. 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.

Toddler Study Data Form (Study 1)

Printed data forms entitled "Toddler Seat Study" 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:

TODDLER SEAT STUDY

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	Belting 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. Toddler 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 Study" 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 STUDY

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.