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Abridgment

Occupant Restraint Use in the Traffic Population: 1984 Annual Report

MICHAEL E. GORYL and MICHAEL J. CYNECKI

ABSTRACT

This paper is a report on the 1984 findings from four independent studies designed to monitor occupant restraint and helmet use for various segments of the traffic population. This study is sponsored by NHTSA and is a continuation of earlier NHTSA studies. The report is based on field observations collected during a 12-month period from January through December 1984. During this period the use of occupant restraints including both safety belts and child safety seats was observed for more than 238,000 drivers and passengers in more than 206,000 passenger vehicles in 19 cities across the nation. Helmet usage was also recorded for operators and passengers of more than 14,000 motorcycles. These study results are not intended to be cross-sectionally representative of restraint use across the country; they are intended to be a measure of restraint use over time, sampled at select metropolitan areas throughout the United States. The observational studies are described.

This paper is a report of findings from four independent studies on occupant restraint and helmet use for various segments of the traffic population. Field observations, collected in 19 U.S. cities from January through December 1984, are the basis for this report. The four studies and their findings are as follows:

1. Driver safety belt use: A total of 130,207 drivers stopped at traffic signals were observed in 1984. Safety belt use during the last data collection period (July to December) was 15.3 percent.
2. Passenger safety belt and child safety seat use: Findings are based on 108,076 passengers observed at shopping mall exits. Child safety seat usage (for infants and toddlers) increased throughout

M.E. Goryl, Goodell-Grivas, Inc., 1732 West Eight Mile Road, Southfield, Mich. 48075. M.J. Cynecki, Streets and Traffic Department, 125 East Washington Street, Phoenix, Ariz. 85004.

1984, reaching 49.3 percent in the period July to December. The percentages of toddlers, subteens, teens, and adults wearing safety belts during the same period were 8.1, 15.2, 7.2, and 13.4 percent, respectively.

3. Safety seat installation characteristics: Observations were recorded on a total of 3,476 child safety seats in vehicles parked at shopping malls. Of toddler seats that require securing by only the vehicle safety belt, 56.4 percent were used correctly. However, only 8.7 percent of toddler seats that require the safety belt and tether were used correctly.

4. Helmet use by operators and passengers of motorcycles and mopeds: Driver and passenger helmet use was observed to be 66.6 and 54.0 percent, respectively, for 14,898 motorcycle observations. Moped observations totaled 1,085 and helmet use among drivers and passengers was 42.1 and 35.0 percent, respectively.

PURPOSES AND PROCEDURES

Drivers in the Traffic Population (driver study)

The purpose of this study was to monitor the use of safety belts by drivers of privately owned automobiles at designated intersection and freeway exit locations. The data collected for each vehicle and driver included license plate number, make and model of car, estimated age of driver and passengers, driver sex, driver safety belt usage, presence of automatic safety belts, and seating position of passengers.

Passengers in the Traffic Population (passenger study)

The purpose of this study was to monitor the use of occupant restraint systems by passengers of private passenger vehicles at exits from selected shopping malls. Special emphasis was placed on observing child safety seat use by infants (less than 1 year of age) and toddlers (ages 1 to 4). The data collected for each passenger included estimated age, seating position, occupant restraint system used, and safety seat usage characteristics for infants and toddlers.

Installation of Child Safety Seats (parking lot study)

This study consisted of observing infant, toddler, and booster safety seats in parked cars at shopping centers to obtain more detailed information on the installation of child safety seats in automobiles. The data collected included position of safety seat in vehicle, tether usage (for toddler seats that require the use of tethers), belt usage (for toddler seats that require that the lap belt be attached to the undercarriage of the toddler seat), shield requirement on toddler seats (if the seat is a shield type), and toddler or infant seat model (type and brand of seat).

Motorcycle and Moped Operators in the Traffic Population (helmet study)

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

Data Collection Sites

The 19 cities in which data were collected are the same as those used in previous studies. The cities and corresponding data collection regions are as follows:

1. New England region
   - Boston, Massachusetts
   - Providence, Rhode Island
2. Mid-Atlantic region
   - New York, New York
   - Baltimore, Maryland
   - Pittsburgh, Pennsylvania
3. Southeast region
   - Atlanta, Georgia
   - Miami, Florida
   - Birmingham, Alabama
   - New Orleans, Louisiana
4. Southwest region
   - Houston, Texas
   - Dallas, Texas
5. Northcentral region
   - Minneapolis-St. Paul, Minnesota
   - Chicago, Illinois
   - Fargo, North Dakota-Moorhead, Minnesota
6. West region
   - Seattle, Washington
   - San Francisco, California
   - San Diego, California
   - Phoenix, Arizona
   - Los Angeles, California

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

Data Collection Schedule and Observation Procedures

The data collection schedule was based on the requirement to complete data collection activities at all sites in all cities during a 3-month period. Each city required approximately 13.5 days of data collection consisting of approximately 7.5 days of driver study and 6 days of passenger study. Helmet observations were recorded throughout the data collection stay as motorcycles and mopeds were observed.

The sites used for data collection in the driver study were primary road intersections and freeway exits. Data were collected at 30 driver study sites (70 percent arterial and 30 percent freeway exit) in each city. In addition, three passenger study locations (shopping malls) within each city were used for data collection. Five observers were employed in data collection efforts. These observers traveled between cities in their assigned region or regions.

Driver study procedures required observers to collect data for 6 hr per day, 1.5 hr at each of four sites. Site assignments included a specific date and time of day for each location. To the extent practical, observers were deployed to a given site on the same day and during the same time period each time the city was studied. Driver study data were collected Monday through Thursday. Only privately owned passenger automobiles and station wagons with in-state license plates were eligible for the driver study. Trucks, taxi cabs, and marked company-owned cars (i.e., those used for commercial purposes) were not eligible.

Passenger study procedures required observers to conduct 6 hr of data collection each day of the passenger study. Data were collected on Fridays, Saturdays, and Sundays to maximize the chance of obtaining observations on infants and toddlers. Six passenger study days were spent in each city during the study period.

Only noncommercial passenger automobiles and station wagons were eligible for the passenger study. The primary target for observation was vehicles with children. When primary target vehicles were not available for observation, safety belt usage for all adult passengers in a particular vehicle was recorded.

Procedures for the study of child safety seat installation required the technicians to observe parked vehicles that contained one or more safety seats (i.e., infant, toddler, or booster safety seats) in shopping center parking lots. The study was conducted at the passenger study shopping centers for approximately 2 hr per week on the normally scheduled days of the passenger restraint study.

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

1984 FINDINGS

Driver Study

In 1984 driver safety belt usage for the 19 cities was 14.4 percent, reaching a high of 15.3 percent in the period from July to December. Driver safety belt use is shown by calendar year for 1983 and by quarter for 1984 in Figure 1. Restraint use by city is given in Table 1. In general, West Coast cities exhibited substantially higher usage rates than did cities in other regions of the country. This finding was also supported by 1983 study results (1).

As in the 1983 study, female drivers were more likely to wear safety belts. The 1984 data indicate 17.0 percent restraint use for females versus 12.7 percent for males (Table 1).

The data in Table 1 also indicate that safety belt usage was highest among the 25 to 49 age group (16.0 percent); this was the only "above average" group. The relative rankings of age groups were similar to 1983 results.

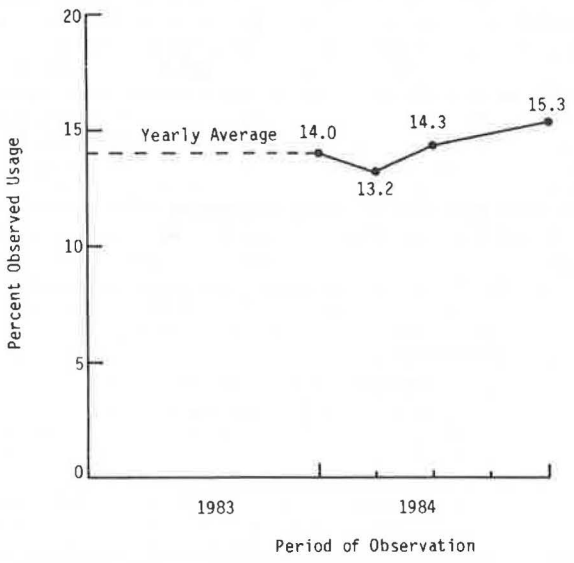


FIGURE 1 Driver safety belt use by quarter.

TABLE 1 Driver Safety Belt Use by City, Sex, and Age

	No. Observed	Percentage Restrained
City		
Boston	6,804	9.6
Providence	7,266	7.1
Pittsburgh	7,333	15.6
Baltimore	6,636	11.8
New York	6,646	8.2
Atlanta	7,041	11.1
Miami	7,050	10.4
New Orleans	7,210	9.0
Birmingham	6,086	8.8
Minneapolis/St. Paul	8,098	20.2
Chicago	7,516	10.4
Fargo/Moorhead	6,089	7.7
Houston	5,565	13.0
Dallas	5,787	12.8
Seattle	7,102	30.1
San Francisco	8,046	24.2
San Diego	8,521	20.6
Phoenix	5,807	20.3
Los Angeles	5,604	18.6
Total	130,207	14.4
Driver sex		
Male	78,881	12.7
Female	51,326	17.0
Total	130,207	14.4
Age group		
Under 20	3,747	10.1
20-24	13,664	12.5
25-49	80,408	16.0
50 or over	32,369	11.8
Unknown	19	0.0
Total	130,207	14.4

License plate numbers recorded during the driver study for the period January through September 1984 were submitted to the various state departments of motor vehicles (DMVs) for the purpose of obtaining vehicle information. Vehicle records sent by the state DMVs were processed with the Vindicator program furnished by the Highway Loss Data Institute (2). The Vindicator program produced valid vehicle information for 80,286 vehicles.

Table 2 gives driver safety belt usage rates for vehicles observed between January and September 1984. Overall 14.2 percent of drivers in this data subset were observed using safety belts. It can be seen that drivers of newer model cars, beginning in 1980, are more likely to wear safety belts than their counterparts in earlier model years.

Using data generated from the Vindicator program, driver safety belt usage was stratified by vehicle size (Table 2). Drivers of smaller sized vehicles with less than 111-in. wheelbases were more likely to wear safety belts than drivers of larger vehicles.

Drivers of imported vehicles were observed to be twice as likely to wear safety belts as their domestic vehicle counterparts. Usage rates of 24.7 percent were observed for drivers of imported vehicles as opposed to 10.6 percent for domestic vehicles (Table 2).

Passenger Study

A total of 108,076 passengers were observed in 76,022 vehicles during 1984. Three specific age groups were recognized within the "child" population: infants

TABLE 2 Driver Safety Belt Use by Model Year, Vehicle Size, and Vehicle Make

	No. Observed	Percentage Restrained
Model year		
1967-1969	1,388	10.4
1970	841	8.3
1971	1,091	7.1
1972	1,748	8.1
1973	2,681	7.9
1974	3,193	9.0
1975	3,245	8.8
1976	4,956	9.2
1977	6,749	10.5
1978	7,802	11.8
1979	8,481	12.9
1980	7,518	15.5
1981	7,721	17.7
1982	7,888	20.0
1983	8,751	19.4
1984	6,233	18.8
Total	80,286	14.2
Vehicle size		
Subcompact (wheelbase less than 101 in.)	28,770	19.8
Compact (wheelbase 101-111 in.)	25,564	14.3
Intermediate (wheelbase 112-120 in.)	18,829	8.5
Full size (wheelbase more than 120 in.)	7,123	6.3
Total	80,286	14.2
Vehicle make		
Import	20,173	24.7
Domestic	60,113	10.6
Total	80,286	14.2

(under 1 year), toddlers (ages 1 to 4), and subteens (ages 5 to 12). Observers categorized children within one of these groups to the best of their ability. However, these observations are relatively difficult and should be considered approximate. Other age categories included teens (13-19 years) and adults (20 years and older).

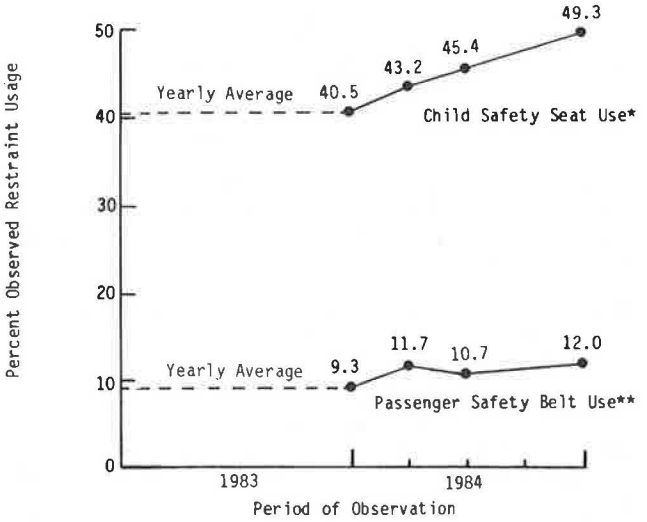
Table 3 gives a summary of 1984 passenger restraint system use for the various age groups. Restraint use for all age groups increased over 1983 results. Passenger safety belt and child safety seat

TABLE 3 Passenger Restraint System Use by Age Group

Age Group	No. Observed	Safety Seat (%)	Safety Belt (%)	Total (%)
Infant	1,493	66.4	0.5	66.9
Toddler	16,873	46.1	7.4	53.5
Subteen	14,346	1.2	13.5	14.7
Teen	13,575		7.2	7.2
Adult	61,789		13.0	13.0

use (children age 4 and under) are shown by calendar year for 1983 and by quarter for 1984 in Figure 2. The highest child safety seat usage rate, 49.3 percent, was observed in the July-December period (6,019 observations). The July-December child safety seat usage rate was 69.2 percent for infants (526 observations) and 47.4 percent for toddlers (5,493 observations). Passenger safety belt use for July-December 1984 was observed to be 12.0 percent based on 31,984 observations.

A total of 1,493 infants were observed in the passenger study. Of this total, 66.4 percent were observed in approved safety seats. If an infant was observed in an approved safety seat, use of the safety seat harness and vehicle safety belt attachment to the safety seat was recorded. If the infant



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

FIGURE 2 Observed use of passenger restraint system by quarter.

was observed to be properly harnessed, belted, and facing the rear of the vehicle, the restraint condition was classified as "Appears Correct." If improper harnessing, belting, or positioning was observed, the condition was classified as "Obviously Incorrect." Overall, 37.8 percent of all infants were observed to be correctly harnessed in an approved safety seat.

Toddler observations consisted of recording the same types of data as were collected for infants. However, due to the difficulty of observing the belting of the toddler safety seat (and in some cases the tether), determination of the correct usage of the toddler seats was based primarily on observation of the harness or shield. A total of 16,873 toddlers were observed during the passenger study. Of these, 44.3 percent were observed in either a toddler seat or booster seat. Unused safety seats were observed in 9.4 percent of the vehicles in which 9,404 toddlers were not in safety seats. Overall, 31.7 percent of observed toddlers were correctly harnessed or shielded in a child safety seat.

A total of 14,346 subteens were observed in the 19 cities during the passenger study. Use of booster seats was observed in 1.1 percent of the cases. Safety belt use for this age group was found to be 13.5 percent compared with 8.6 percent in 1983.

Teenagers were observed to have the lowest safety belt usage of all age groups excluding infants. Of a total of 13,575 teens, only 7.2 percent were observed using safety belts. This compares with 7.0 percent for 10,937 teens observed in 1983.

Adult passengers were observed wearing safety belts in 13.0 percent of 61,789 observations. This compares with the 10.5 percent usage rate of the 1983 study.

Study of Child Safety Seat Installation

Passenger study observations were made from curb locations at shopping mall exits. Because of the limited time available to make an observation and the vantage point, certain aspects of child safety seats are difficult, if not impossible, to observe. For example, observations of the make of safety seat, the correctness of vehicle safety belt use, and the correctness of or need for tethering are difficult to make. To better determine the usage characteris-

tics of child safety seats, a study was designed to provide information on safety seat installation (in parked, unoccupied vehicles) that could not be obtained as part of the passenger study.

During this study, 3,476 unoccupied safety seats were observed. Of the 327 seats observed in an infant mode (rearward facing) about half were of the "infant-only" variety. Within the toddler seat category, two types of systems are available for securing the safety seat to the vehicle seat: (a) securing with the safety belt only and (b) securing with the safety belt and a tether. Of the 3,064 toddler seats observed, 64.2 percent were the belt-only and 35.8 percent were the belt and tether systems.

A total of 1,968 toddler seats requiring securing with safety belts only were observed. In 56.4 percent of the observations, the safety belt was properly used to secure the toddler seat. The safety belt was observed not in use for 6.9 percent of the observations and improperly used 36.7 percent of the time.

Of the 1,096 toddler seats that require both a safety belt and tether for proper securing, only 8.7 percent were observed to be properly secured in the vehicle. Failure to tether the seat was the most predominant type of misuse observed (83.5 percent). However, when a tether was used, it was used improperly in only 1.9 percent of the observations. On the other hand, the safety belt was used in 91.7 percent of all observations. However, in more than 35 percent of the observations, the safety belt was incorrectly secured (routed) to the toddler seat.

Helmet Study Findings

During the period from January to December 1984, 18,094 observations were made of helmet use by operators and passengers of motorcycles and mopeds. Of 14,898 motorcycle drivers, 66.6 percent were observed wearing helmets. In cities with mandatory helmet use laws, the usage rate was 99.7 percent, whereas helmet use was observed to be 51.3 percent in cities with no or limited helmet use laws. Passenger helmet use was observed to be 54.0 percent--98.4 percent in cities with mandatory use laws and 34.8 percent in cities with no or limited use laws. Helmet use for drivers of mopeds (motorized bicycle) was 42.1 percent. Passengers of mopeds were less likely to be observed wearing helmets with 35.0 percent observed usage.

SUMMARY

A review of the 1984 observation data indicates an increase in occupant restraint usage over 1983 rates, and this trend is continuing for 1985 observation studies. Although the relative nonuse of safety belts is disheartening, the steady increase, coupled with the onset of mandatory restraint legislation, is encouraging.

The 1984 restraint data were collected before the first state mandatory belt use law was passed in New York, followed by other states throughout 1985, so such laws were not a factor in the 1984 increase. The factors responsible for the increase may be complex and include increased safety awareness and concern, easier and more comfortable vehicle restraint systems associated with newer vehicles, media attention to impending mandatory restraint legislation, "fallout" from the passage of child restraint laws, and changes in socioeconomic factors. It was not within the scope of this study to determine those factors or combinations of factors responsible for safety belt usage but to obtain reliable trend data sampled from various parts of the country and identify select factors associated with high or low safety belt use in a cost-effective manner.

Dramatic increases in child safety seat use were observed in the 1984 19-city data. Not coincidently, 1984 was a year in which many of the remaining states without mandatory child restraint legislation passed such legislation, and others strengthened legislation to improve child occupant transport. Although the use of child safety seats is increasing, these studies indicate the need for concern about the proper use of safety seats. For example, toddler seats that require a tether strap to properly secure the seat were more likely to be incorrectly secured to the vehicle than were nontether seats.

The effects of mandatory safety legislation can also be seen in helmet use where observed usage rates varied from more than 99 percent in states with mandatory helmet use laws to 51 percent in places where there are no such laws.

As stated earlier, the monitoring of occupant restraint use in the 19 cities is continuing. This information, along with special data collection efforts in states passing mandatory restraint legislation, should provide interesting and insightful data in the coming years.

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