Smith

March 1982
NHTSA Technical Report

DOT HS-806 142

U.S. Department
of Transportation

**National Highway
Traffic Safety
Administration**

Effectiveness and Efficiency of Safety Belt and Child Restraint Usage Programs

Traffic Safety Programs
Office of Program and Demonstration Evaluation

Technical Report Documentation Page

1. Report No.	2. Government Accession No.	3. Recipient's Catalog No.
DOT-HS-806-142		

4. Title and Subtitle	5. Report Date
Effectiveness and Efficiency of Safety Belt and Child Restraint Usage Programs	March 1982
	6. Performing Organization Code: NTS-40
	8. Performing Organization Report No.
7. Author's: Dr. James L. Nichols	
9. Performing Organization Name and Address: Office of Program and Demonstration Evaluation, Traffic Safety Programs, National Highway Traffic Safety Administration, U.S. Department of Transportation, Wash., DC 20590	10. Work Unit No. (TRAIS)
	11. Contract or Grant No.
12. Sponsoring Agency Name and Address: Same	13. Type of Report and Period Covered: Problem and Countermeasure Review: 1966-1981
	14. Sponsoring Agency Code: NTS-40

15. Supplementary Notes

16. Abstract

Problem: Each year, approximately 34,000 persons are killed and 520,000 receive moderate to severe injuries as occupants of passenger cars, light trucks and vans. Approximately half of these deaths and injuries could be avoided if all such occupants wore safety belts and used child safety seats for their young children. Unfortunately, fewer than 12 percent of all drivers and even fewer passengers are observed to use their safety belts. Approximately 20 percent of children under age 5 have been observed to be in a safety restraint.

Methods for Increasing Usage: The primary methods for increasing safety belt and child restraint usage are: (1) public information (mass media) programs; (2) education programs; (3) incentive programs; (4)organizational policies requiring belt use while on official business; and (5) safety belt and child restraint usage legislation. A review of such programs has suggested that combined public information, education, incentive and use requirement policy programs could substantially increase the usage rates among specific target groups, at the community level, at the State level or at the national level. However, such programs must be implemented in a comprehensive fashion (reaching many persons) over a substantial period of time. Incentive programs offer significant potential for increasing the impact of the other approaches. Unfortunately, incentive programs have been used infrequently in the past. Foreign legislation efforts have resulted in 50 percent increases in usage rates and 15-20 percent reductions in death and injury. Prior to such legislation, many of these nations have achieved usage rates in the 25-40 percent range by means of voluntary methods, limited primarily to mass media programs. In the United States, a savings of 4,400 lives and an avoidance of 87,000 moderate to critical injuries could be achieved with only a 35 percent usage rate, well within the range achieved in some nations.

Suggested Approaches: A review of past studies designed to determine the reasons for low belt usage and of possible approaches for countering such reasons suggests the following considerations to be included in any future efforts to increase safety belt and child restraint usage in the Untied States: (1) many other groups and organizations have to be involved in the program; (2) automobile deaths and injuries must be viewed as a public health problem; (3) current interest in child restraints should be capitalized on; (4) the economic costs of belt non-use must be better documented; (5) more emphasis on incentive programs should be encouraged; (6) comprehensive, multi-faceted programs should be implemented by "networks"of organizations; (7) many different target groups must be addressed; and (8) a program based on voluntary usage is most appropriate at the present time. Such a program is presently being developed by the NHTSA.

17. Key Words	18. Distribution Statement
safety belt, seat belt, child restraints, occupant restraints, restraints, and belt usage.	Distribution available to the U.S. Public through the Nat'l Technical Information Service, Springfield, VA 22161.

19. Security Classif. (of this report)	20. Security Classif. (of this page)	21. No. of Pages	22. Price
Unclassified	Unclassified	113	

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METRIC CONVERSION FACTORS

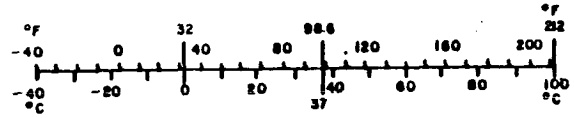
Approximate Conversions to Metric Measures

Symbol	When You Know	Multiply by	To Find	Symbol
	LENGTH			
in	inches	*2.5	centimeters	cm
ft	feet	30	centimeters	cm
yd	yards	0.9	meters	m
mi	miles	1.6	kilometers	km
	AREA			
in^2	square inches	6.5	square centimeters	cm^2
ft^2	square feet	0.09	square meters	m^2
yd^2	square yards	0.8	square meters	m^2
mi^2	square miles	2.6	square kilometers	km^2
	acres	0.4	hectares	ha
	MASS (weight)			
oz	ounces	28	grams	g
lb	pounds	0.45	kilograms	kg
	short tons (2000 lb)	0.9	tonnes	t
	VOLUME			
tsp	teaspoons	5	milliliters	ml
Tbsp	tablespoons	15	milliliters	ml
fl oz	fluid ounces	30	milliliters	ml
c	cups	0.24	liters	l
pt	pints	0.47	liters	l
qt	quarts	0.96	liters	l
gal	gallons	3.8	liters	l
ft^3	cubic feet	0.03	cubic meters	m^3
yd^3	cubic yards	0.76	cubic meters	m^3
	TEMPERATURE (exact)			
°F	Fahrenheit temperature	5/9 (after subtracting 32)	Celsius temperature	°C

*1 in = 2.54 (exactly). For other exact conversions and more detailed tables, see NBS Misc. Publ. 286, Units of Weights and Measures, Price $2.25, SD Catalog No. C13.10:286.

Approximate Conversions from Metric Measures

Symbol	When You Know	Multiply by	To Find	Symbol
	LENGTH			
mm	millimeters	0.04	inches	in
cm	centimeters	0.4	inches	in
m	meters	3.3	feet	ft
m	meters	1.1	yards	yd
km	kilometers	0.6	miles	mi
	AREA			
cm^2	square centimeters	0.16	square inches	in^2
m^2	square meters	1.2	square yards	yd^2
km^2	square kilometers	0.4	square miles	mi^2
ha	hectares (10,000 m^2)	2.5	acres	
	MASS (weight)			
g	grams	0.035	ounces	oz
kg	kilograms	2.2	pounds	lb
t	tonnes (1000 kg)	1.1	short tons	
	VOLUME			
ml	milliliters	0.03	fluid ounces	fl oz
l	liters	2.1	pints	pt
l	liters	1.06	quarts	qt
l	liters	0.26	gallons	gal
m^3	cubic meters	35	cubic feet	ft^3
m^3	cubic meters	1.3	cubic yards	yd^3
	TEMPERATURE (exact)			
°C	Celsius temperature	9/5 (then add 32)	Fahrenheit temperature	°F



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Executive Summary

The Problem

Each year approximately 34,000 persons are killed and 520,000 persons receive moderate to severe injuries as occupants of passenger cars, light trucks, and vans.

These deaths and injuries result when vehicle occupants are smashed against the vehicle's interior or are ejected from the car and either crushed by it or impact against obstacles outside the vehicle. This is what is known as the "second collision" as opposed to the "first collision", when their car hits some obstacle such as another car, a tree, an embankment, etc.

There is unequivocal evidence that safety belts and child restraints could prevent about half of all such deaths and injuries if all occupants would only use them. Unfortunately an average of less than 12 percent of vehicle drivers and even fewer passengers are observed to be using their belts at any one time.

Methods for Increasing Usage

A. Public Information (Mass Media Programs)

Mass media programs, used alone, are unlikely to raise usage rates substantially although some (e.g., in Great Britian) have achieved usage rates of approximately 35 percent. The Great Britain example represented an increase of nearly 200 percent above a baseline of 12 percent usage in 1971.

In the U.S. no concerted mass media campaigns have been conducted over a long period of time. One local program raised usage rates from 17.5 percent to 20.8 percent (among drivers), an increase of 19 percent (or 3.3 percentage points). Another raised overall usage rates from 12.4 percent to 16.8 percent, an increase of 35 percent (or 4.4 percentage points). A third and a fourth failed to significantly raise usage rates.

Most mass media campaigns have resulted in measured increases in knowledge about belt usage and positive attitudes toward belt usage. In foreign nations, mass media campaigns have greatly facilitated the passage of safety belt usage legislation.

B. Education Programs

Educational programs for specific target groups have more potential for raising usage rates among specific groups but are constrained by the fact that each program reaches many fewer persons than does a mass media program. Thus, comprehensive "networking" approaches will be required if educational programs can ever have a national impact.

One survey found that students of driver education use their belts 160 percent more frequently (usage rate = 26 percent) than do persons who taught themselves to drive (usage rate = 10 percent). Some of this difference is likely due to more safety conscious persons opting for driver education in the first place. However, one study of educational programs showed a 157 percent increase in safety belt usage from a very low level (i.e., from 3.3 percent to 8.5 percent). Another approach resulted in a 49 percent increase from a higher baseline rate (i.e., from 13.5 percent to 26.7 percent).

In the child restraint area, child restraint usage rates have been increased by 60 percent (i.e., from 26 percent to 41 percent; or 15 percentage points) and by 72 percent (to a high of approximately 62 percent) in two separate programs. However, there were complicating factors of improper usage, decreased differences in usage between experimental and control groups over time, etc.

Loaner programs in some States (e.g., Iowa) have been able to increase usage by nearly 200 percent from 10 percent to 29 percent (an increase of 19 percentage points). Overall, usage of child restraints has increased substantially over the past 2 years. Much of this increase is throught to be due to combined education and child seat loaner programs.

In the safety belt area, educational programs can result in usage rates (among specific target groups) in the 30-40 percent range. In the child restraint area, usage rates of 40-50 percent (or higher) can be achieved among specific target groups, if accompanied by loaner, rental, or discount sales programs. Educational program have greater potential when they are accompanied by incentives for belt use.

C. Incentive Programs

Incentive programs are perhaps the most underused, yet potentially most powerful of all voluntary usage approaches. Using a combination of mass media, education and incentive programs, the Swedish government was able to raise usage rates by as much as 100 percent on city streets (i.e., from 12 percent to 25 percent) and by as much as 60 percent on rural roads (i.e., from 37 percent to nearly 60 percent).

In the U.S., one company, using a combination of a use requirement policy, educational programs and incentives, raised usage rates from 50 percent to 90 percent. In another program, usage rates were increased from 18 percent to 57 percent during the incentive period (an increase of 216 percent or 39 percentage points).

Incentive programs, like other measures, are not most effective when used alone. However, they provide considerable additional potential for mass media, education, employer belt use policies and legislation programs.

D. Belt Use Policy Programs

Organizational and company policies which require belt usage while on the job or while in company vehicles offer powerful approaches for increasing belt usage among various segments of the population. Getting large numbers of employers motivated to implement such policies is not a simple task. Nor should such policies be implemented in absence of education, incentive and enforcement efforts.

Some programs such as those by DuPont, Northwestern Bell, Dow Chemical, the Air Force, and the State of Iowa have been able to achieve usage rates from 60-90 percent while on company property. Even with less intense programs, usage rates between 50 and 60 percent have been achieved. Belt use off the job is also increased and appears to range from 30-40 percent with less intense programs to as high as 50-60 percent with the more intense programs. Many of these rates are not well documented by observational surveys however.

E. Legislation

Foreign laws requiring belt use have provided powerful evidence for increasing safety belt usage. Usage rates of 70-90 percent have frequently been reported as a result of publicized, enforced usage laws, especially when they have been accompanied by education and incentive programs. In the United States, however, this is a matter of State choice. Furthermore, concerns for individual freedom are much more prominent in this country.

In the area of child restraints, usage rate increases resulting from legislation have been somewhat smaller. However, it does appear that child restraint legislation is more viable among the States, as more than 10 States have already passed some form of child restraint legislation.

Effectiveness of a Fully Implemented Voluntary Usage Program

For each one percent increase in usage on a national basis, NHTSA currently estimates over 180 lives would be saved per year. A savings of 4,400 lives and avoidance of 87,000 moderate to critical injuries could be achieved with only a 35 percent usage rate, well within the range of voluntary usage achieved in other nations.

I. Problem Statement

The problem addressed in the safety belt and child restraint area is twofold, consisting of: (1) death and injury to occupants of passenger vehicles as a result of crashes, and (2) failure of adults to wear safety belts or to use child restraints for infants and young children (under age five).

A. Total Passenger Deaths and Injuries

Relative to death and injury to occupants of automobiles, Table 1 shows the number of occupants killed or injured in 1979. These figures are from the National Center for Statistics and Analysis using data from the Fatal Accident Reporting System and estimates of injuries derived from the National Accident Sampling System for 1979. These data refer to moderate-to-serious non-fatal injuries (AIS 2-5).

Table 1
Fatalities and AIS 2-5 Injuries for Occupants of Passenger Cars and Light Trucks in 1979

	Fatalities	AIS 2-5 Injuries
Passenger Cars	27,799	430,000
Light Trucks (> 10,000 lbs GVWR)	6,453	90,000
Total	34,252	520,000

Source: Fatal Accident Reporting System and National Accident Sampling System.

As Table 1 indicates, nearly 28,000 fatalities and approximately 430,000 moderate to serious injuries occur each year to passenger car occupants. The number of fatalities to occupants of light trucks and vans is about 6,500 and the number of moderate-to-serious injuries to occupants of light trucks and vans is about 90,000.

B. Child Passenger Deaths and Injuries

Table 2 shows child (age 4 and under) occupant fatalities for passenger cars and light trucks and vans over the 6 years from 1975 through 1980. About 185 children under age 1 year and about 510 children 1-4 years of age are killed each year in such vehicles. Fatalities for the 1-4 age group dropped 5 percent below the average in 1980.

Table 2
Child Fatalities as Occupants of
Passenger Cars and Light Trucks and Vans.

Year	AGE	
	Less Than 1 Year Old	1-4 Year Old
1975	191	515
1976	172	506
1977	192	521
1978	194	516
1979	173	512
1980	189	482
Average	185	509

Source: Fatal Accident Reporting System

Infants riding as motor vehicle occupants have an extremely high death rate (deaths per 100,000 population) as compared with older children. In a study conducted for the Insurance Institute for Highway Safety (60), one researcher found that the occupant death rate for infants under age 6 months is three times as great as the rate for children aged 6-12 years. Figure 1 shows this relationship.

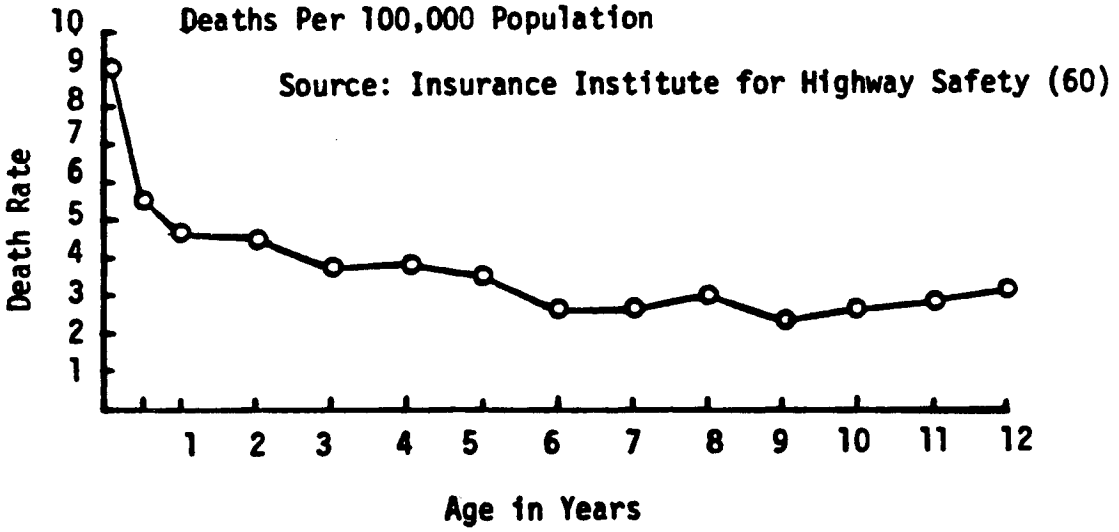


Figure 1
Vehicle Occupant Death Rates for Children

The high death rate for infants is thought to be partially due to a greater likelihood of infants being in the front seat and/or held in someone's arms. Children traveling on adults' laps (especially in front seating positions) are much more susceptible to being seriously injured or killed by being crushed between the adults and unyielding interior structures (60).

C. Low Usage Rates

A second major problem is one of low safety belt and child restraint usage. As this will be covered in a later section, suffice it to say that at present, fewer than 12 percent of the drivers of passenger vehicles wear their safety belts, and only about 20 percent of young children under the age of five years are protected by an acceptable child restraint device (99, 100).

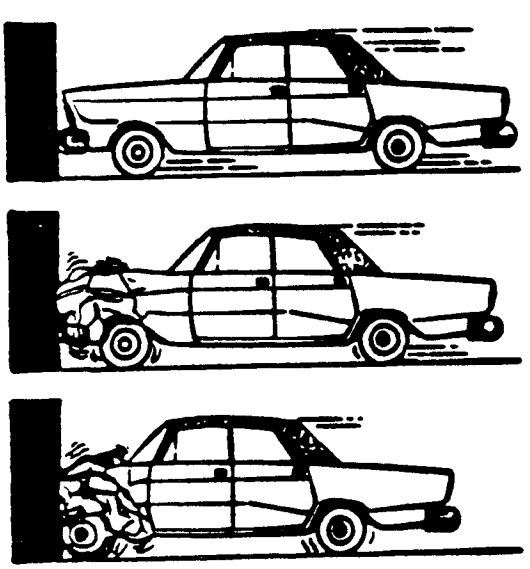
Again if all vehicle passengers wore their belts (or were protected by a child safety seat), it is estimated that about half of the fatalities and injuries which are presently incurred by passengers of automobiles, and vans and light trucks could be prevented.

II. How Safety Belts and Child Restraints Work

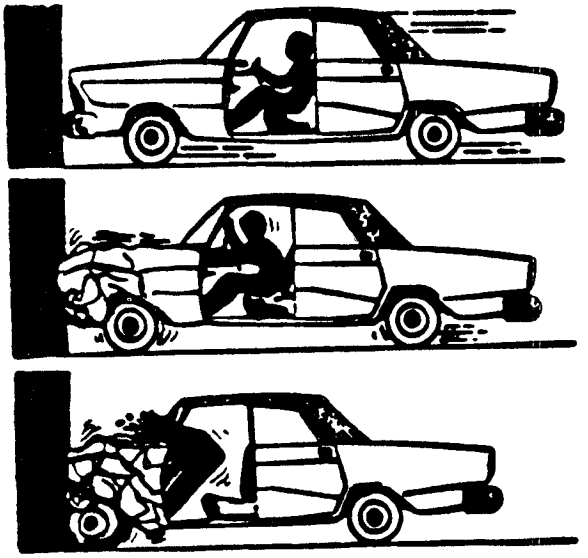
A. What Happens in a Collision?

Every motor vehicle accident involves two collisions. The first involves the vehicle: it crashes into something. The second involves the occupants: they crash into the vehicle's interior. In the first collision, property may be damaged, sometimes severely, but generally it can be replaced. However, humans are injured or killed in the second collision. Limbs, organs, or people cannot be replaced. It is the second collision, the human collision, that causes passenger deaths and injuries (59). Figure 2 illustrates these two collisions.

Source: Ontario Ministry of Transport (59)



2A. The First Collision: (The Car's Collision)



2B. The Second Collision: (The Human Collision)

Figure 2
What Happens in a Collision:
The Cars Collision Versus the Human Collision

If the second (human) collision goes unmanaged, the body areas most frequently and most severely injured are: (a) the head; (b) the chest; and (c) the abdomen. The principal injury-producing objects include: (a) the exterior of the car and the outside environment; (b) the steering wheel (including the hub); (c) the windshield and frame; (d) the instrument panel; (e) the door frame and glass; and (f) the roof. These danger areas are illustrated in Figure 3 (59).

Source: Ontario Ministry of Transport (59)

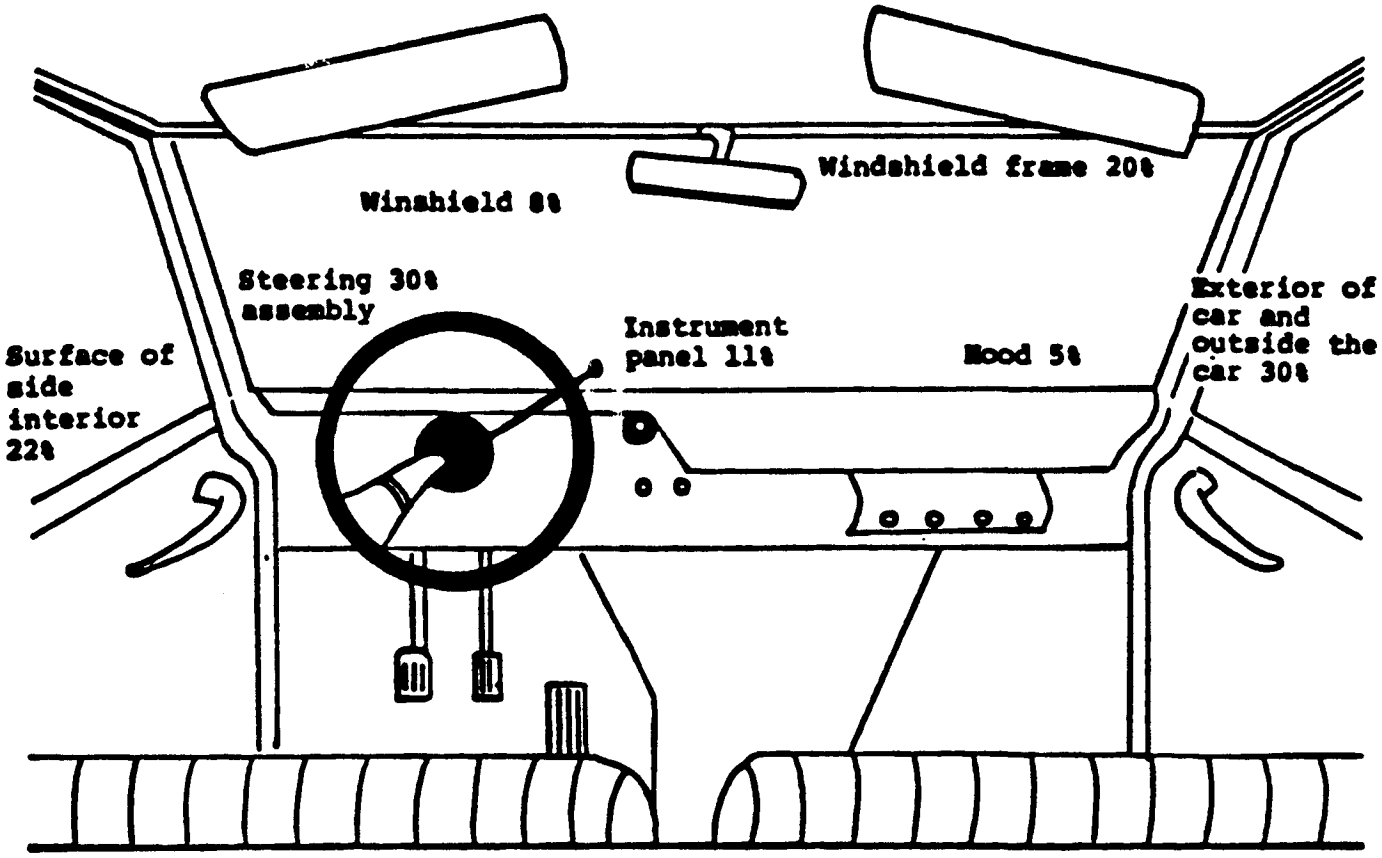


Figure 3
Primary Injury Producing Impact Areas

B. What Safety Belts Do

The aim of safety belts is to: (a) take advantage of the crushing effects of the vehicle as it absorbs energy in the first collision; and (b) dissipate the forces of the human collision across time (by the crushing of the vehicle and by the stretching of the belt) and across the surface of the body through a relatively safe medium (the belt) rather than a through dangerous medium (abrupt impact with glass or steel surfaces).

Safety belts prevent or minimize injuries in six ways:

1. There is the "ride down" benefit, in which the belt begins to stop the wearer as the car is stopping.

2. The belt keeps the head and face of the wearer from striking objects like the wheel rim, windshield, interior post, or dashboard.

3. The belt spreads the stopping force across the strong parts of the body.

4. Belts prevent vehicle occupants from colliding with each other.

5. Belts help the driver to maintain vehicle control, thus decreasing the possibility of an additional collision.

6. Belts prevent the occupant from being ejected.

The ability of safety belts to minimize the effects of the human collision is illustrated in Figure 4.

4A. Car Slows

- o After Impact,Car Slows
- o Front Crushes,Absorbs
- o Person Moves Forward
- o Belts Tighten,Stretch
- o Belts Slow Person Down

4B. Car Stops

- o 1/10th Sec.,Car Stops
- o Belts Hold Person Back
- o Impact Distributed (Across Time and Body)
- o No Impact With Dash, Steering Wheel,Windshield

Figure 4
How Safety Belts Work

C. What Child Restraints Are

Infants and toddlers (children less than four years of age) are top heavy and susceptible to head and spinal cord injury. They need to be properly protected in a dynamically "crash-tested" child safety seat. If a child safety seat is not available, children should be secured by a lap belt in the rear seat of the vehicle.

There are different categories or types of child safety seats. Various educational programs may refer to them in slightly different ways. One way of categorizing them is as follows:

1. **Infant carriers** (Figure 5a)

   - o These child safety seats provide maximum head protection by positioning the infant (0-9 months) in a rearward facing semi-reclining position.

2. **Toddler safety seats:** seats with internal belt systems (Figure 5b)

   - o This type of child safety seat has an internal strap/belt system to secure the child (9 months to 4 years). The strap/belt system has two shoulder straps, a lap belt, and a crotch belt.

   - o Some models sit up high on the vehicle seat and require an additional top tether anchoring strap. The top tether anchoring strap must be attached to the metal structure of the vehicle.

3. **Seats Without Internal Belts** (Figure 5c)

   - o This type of child safety seat fits over the front of the child, and is designed to catch and cushion the child in a crash.

   - o A protective shield is fastened to the vehicle seat by the safety belt. The safety belt is secured around the front of the shield.

4. **Convertible Safety Seats** (not shown)

   - o The term convertible means that this type of safety seat has one position designed to protect the child from infancy to about nine months of age or 20 pounds.

   - o A second "toddler" position used for the child between about nine months of age (or 20 pounds) up to about four years of age (or 40 pounds).

5. **Safety Harnesses** (Figure 5d))

   - o A safety harness is a double shoulder harness which resembles the belt used inside some toddler seats. (No tested harnesses are on the market as of January 1982).

6. **Booster Seats** (not shown)

   o A booster seat is merely a firm (dynamically tested) cushion which the child sits on and through which the car safety belt is fastened. These seats are the newest additions to the market. They utilize the rear seat lap belt only.

7. **Lap Belts**

   o When a safety seat is not available the safest place for a child is in the rear seat restrained by a lap belt.

5A. Infant Carrier

5B. Toddler Seat (with harness)

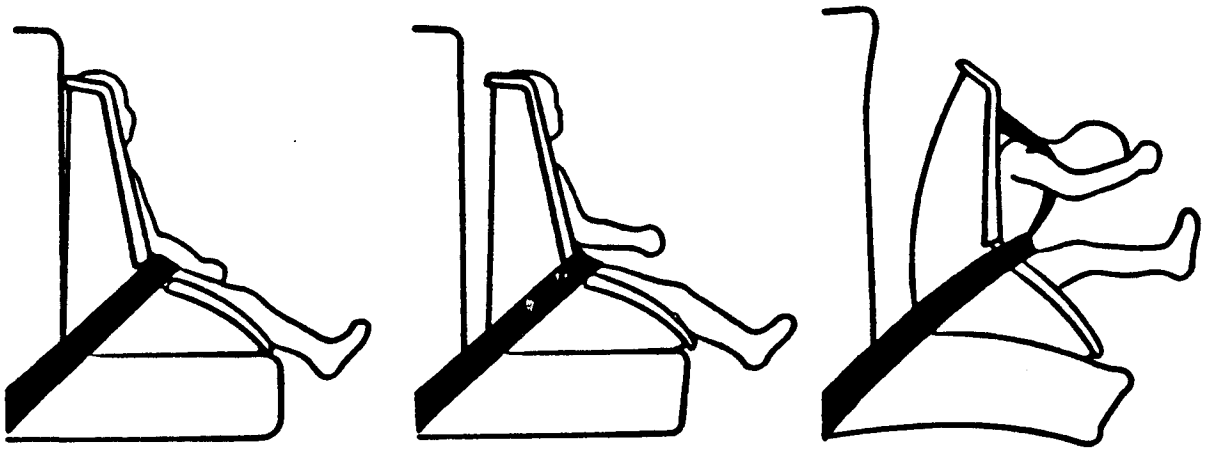
5C. Toddler Shield

5D. Safety Belt Harness

Figure 5
Four Primary Types of Child Safety Seats

D. What Child Restraints Do

Child safety seats work like safety belts, except that they are more effective for young children: (1) they take advantage of the "ride-down" effect; (2) they distribute the impact over time (by the belt stretching); (3) they distribute the forces across a childs body; and (4) they prevent the child from striking the more hostile forces of the car's interior (or other passengers). Figure 6 illustrates how child safety seats work.



6A. Car Contacts 6B. Car Slows 6C. Car Stops

Figure 6
How Child Safety Seats Work

III. Effectiveness of Safety Belts and Child Restraints

A. Safety Belt Effectiveness

Evidence for the effectiveness of safety belts in reducing deaths and injury severity is substantial and unequivocal. Such data come from two primary types of studies: (1) comparisons of the injury and death rates of crash involved belt wearers with those of non-wearers; and (2) studies of changes in the level of occupant injuries and deaths in nations which have experienced rapid increases in belt usage.

1. Comparisons of Crash-Caused Injuries of Belt Wearers Versus Non-wearers

Crash studies which compare the injury rates of belt wearers versus non-wearers are most useful from the standpoint of quantifying the injury-reduction effectiveness of belts when worn. Since these studies compare all injuries of belt wearers with those of non-wearers, they include any injuries which might be caused by the belt (whether due to improper wearing or not). A chronological summary of the findings of several of these studies follows:

- A 1961 study by Huelke (58) investigated 139 accidents involving 177 fatalities. This study indicated that 40 percent of the persons killed in auto crashes could be saved by wearing lap belts and that another 13 percent could be saved by wearing shoulder belts.

- A 1967 study by Bohlin (12) is perhaps one of the largest and most widely known studies of safety belt effectiveness. In this study the value of a three point safety belt system was evaluated by means of a statistical analysis of more than 28,000 accident cases in which 37,511 unbelted and belted front-seat occupants were involved. The results of the study indicated that the average injury reducing effect of the lap and shoulder belt was between 40 percent and 90 percent depending on accident speed and type of injury. (Non-belted occupants substained fatal injuries throughout the entire speed scale, whereas none of the belted occupants were fatally injured at accident speeds below 60 mph).

- A 1969 study by Kihlberg (66) investigated both injury and non-injury crashes in rural Utah. Comparing similar crashes, unbelted occupants were injured significantly more frequently and more severely than lap belted occupants. Kihlberg's conclusion was that lap belts reduced the risk of being injured by 29 percent, the risk of being more seriously injured by 41 percent, and the risk of being severely or fatally injured by 50 percent.

- o A 1971 study by Levine and Campbell (68) investigated police reported crashes occurring in North Carolina in 1966 and 1968 where there was personal injury or property damage in excess of $100. The results of the study indicated that lap belts were 43 percent effective in reducing the number of serious injuries or fatalities to the drivers in these crashes.

- o Finally, a 1976 study for the NHTSA by Reinfurt, Silva, and Seila (110) investigated 15,000 1973-75 model cars involved in towaway accidents. This study included 10,758 observations of drivers and right-front-seat occupants in five States. The study indicated that the lap belt reduced these front seat occupants' chances of suffering an injury (AIS 2 or greater) by 31 percent. It was estimated that the lap/shoulder combination reduced this level of injury by 57 percent.

A summary of the results of these studies is provided in Table 3. Figures in the left column are for the effectiveness of belts in reducing non-fatal injuries. Those in the right column represent fatality reduction effectiveness. Those figures between the two columns represent combined death and injury reduction estimates. It is interesting to note that, with the exception of the Swedish study by Bohlin (which included shoulder belts), the effectiveness estimates of earlier studies are less then of the 1976 study by Reinfurt, Silva, and Seila (110). Much of this increase in effectiveness is thought to be due to increased usage of lap and shoulder belt systems.

Table 3
A Summary of Belt Effectiveness Study Results
(1961-1976)

Year	Author	Effect (Injuries)		Effect (Deaths)
1961	Huelke (90)			40-53%
1967	Bohlin (52)	40-90%		
1969	Kihlberg (102)	30-40%		50%
1971	Levine & Campbell		(43%)	
1976	Reinfurt, Silva, & Seila (30)		(57%)	

Source: Reinfurt et al. (110).

The results of the 1976 study (110) are summarized according to injury severity in Table 4.

Table 4
The Injury Reduction Effectiveness of Lap and Shoulder Belt Versus Lap Belts Only

AIS Injury Level		Effectiveness (%) Lap Belt	Lap and Shoulder Belt
1.	Minor	.15	.30
2.	Moderate	.22	.57
3.	Severe	.30	.59
4-6.	Fatal	.40	.60

Source: Reinfurt et al. (110).

Interestingly enough the Reinfurt et al. study (110) also found the effectiveness of safety belts to be as high or higher in side impact crashes as in frontal or rear crashes. This is throught to be due to decreased ejection from the vehicle in side-impact crashes. Figure 7 illustrates this finding.

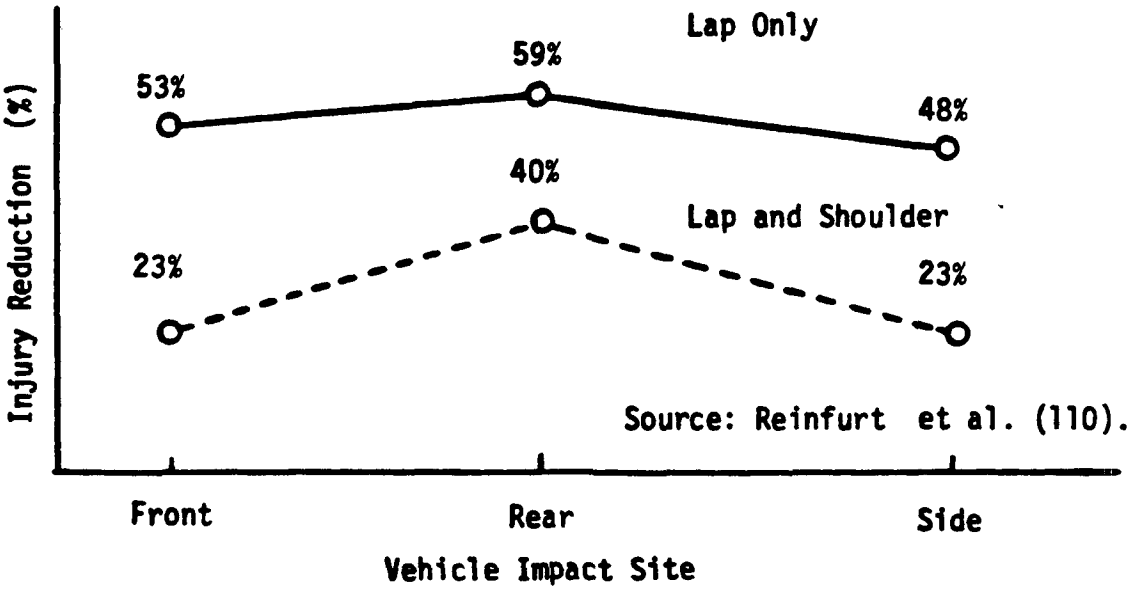
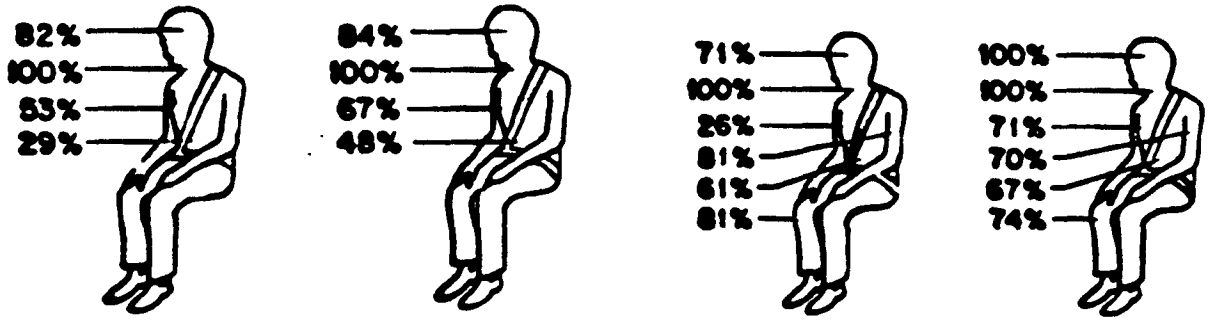


Figure 7
Overall Injury Reduction Effectiveness of Lap Only and Shoulder Belts in Various Crash Types

In addition, a recent study by Huelke (56), has estimated the effectiveness of lap and shoulder belts in reducing deaths as 77 percent in frontal crashes and 91 percent in rollovers. Figures 8a and 8b show reductions in fatalities and injuries for various body areas.

In the past, the most frequently cited NHTSA estimates of the effectiveness of safety belt systems have been based on the results of the Reinfurt et al. study (110). More recently, however, NHTSA reports (89a, 89b, 89c) have cited data from the National Crash Severity Study (NCSS). These studies estimate the effectiveness of safety belts in reducing fatalities as 50 percent and the effectiveness in reducing injuries (AIS 2-5) as 65 percent. Another NHTSA study (145a) estimates effectives as 49 percent for fatalities and 53 percent for more severe injuries (AIS 3-5). Many additional studies have been conducted (15, 19, 23, 61, 68, 80, 82, and 90).

Source: Huelke (56).



8A. Fatality Reduction **8B. Serious Injury Reduction**

Figure 8a and 8b
Effect of Safety Belts in Reducing Fatalities and Injuries

2. Effect Of Increased Belt Usage on Foreign Injury and Fatality Death Rates

From a real world stand point, some of the most empirical data concerning the effectiveness of safety belts has come from studies which have investigated actual changes in death and injury rates in nations which have substantially increased safety belt usage. These data come from countries which have passed mandatory safety belt usage laws.

The results of such studies will be reviewed more completely in the section of this paper dealing with safety belt legislation. However, it is important at this point to summarize the findings of such studies. Several nations have obtained usage rates of 70 percent or greater. While some have reported reductions in death and injury as high as 40-50 percent, most verified reductions have been in the 15-30 percent range depending on which crashes (and occupants) are being investigated (7, 8, 71, 103, 114, 163). These findings take into account the fact that early converts to belt usage may have slightly lower crash risk probabilities than do those who are among the last to begin using safety belts (24, 71, 114).

3. Summary of Findings Concerning the Effectiveness of Safety Belts.

The results of safety belt usage effectiveness studies have been not only dramatic but consistent as well. So much so, in fact, that a recent Canadian report on the subject of safety belts (129) stated:

> The question of whether seat belt assemblies are effective in attenuating injuries has been the object of intense scrutiny through controlled investigations both inside and outside the laboratory. With virtually no exceptions, the results of such studies have been unanimous in their declaration--seat belts provide an effective mechanism for reducing injuries to motor vehicle occupants. In view of the consistency of these findings, coupled with the apparent concern of the motoring public for road safety, as well as for the preservation of their health, it is somewhat paradoxical, if not bewildering to many road safety officials, that people so often choose not to take advantage of seat belts as potential life-support systems.

In terms of the U.S. crash problem, about 17,000 fatalities and 320,000 moderate-to-severe (AIS 2-5) occupant injuries could be prevented each year if safety belts were worn by all vehicle occupants. These estimates are based on the more recent effectiveness estimates of 50 percent for fatalities and 65 percent for injuries (AIS 2-5).

B. Effectiveness of Child Restraint Devices

The effectiveness estimates for child restraint devices are somewhat more varied than those for safety belts. One study of crashes conducted in the State of Washington (121, 122) estimated the effectiveness of such devices at 90 percent in reducing deaths and 67 percent in reducing disabling injuries. A Michigan report (94) estimated the injury reduction effectiveness at 36 percent and a study by the Center for Environment and Man (16) estimated the effectiveness of child restraints in reducing deaths and injury as ranging between 30-41 percent depending on whether minor injuries are included (30 percent effectiveness) or omitted (41 percent effectiveness).

Results from the State of Tennessee's evaluation of their child passenger safety law (shown in Table 5) indicate that the effectiveness of child restraints in reducing major injury is between 46-71 percent (105). It should be noted that in both the Michigan (94) and Tennessee (105) studies there were 19-20 infant fatalities, all of which occurred to unrestrained children.

Table 5
A Comparison of Injuries Sustained by Restrained and Unrestrained Children in the State Tennessee

	% Sustaining Injuries	
	Minor	Major
1978		
Restrained	25.9%	4.5%
Unrestrained	38.0%	8.3%
1979		
Restrained	29.0%	5.5%
Unrestrained	43.1%	19.0%

Source: Perry et al. (105)

Thus, real world estimates of the effectiveness of child safety seats range from 30-90 percent, depending on the type of study and the level of injury. Many of such studies have not controlled for improperly used child restraints (which of course, lowers estimates of effectiveness). Existing data along with laboratory evidence suggest that effectiveness estimates of 50-60 percent for properly used child restraints would be very realistic. In general, effectiveness appears to increase for more severe injuries and fatalities.

C. The 1976 Highway Safety Needs Study

The 1976 Highway Safety Needs study (88) transmitted to the Congress by the U.S. Department of Transportation suggested that of 37 highway crash countermeasures listed, safety belts ranked first relative to the potential for preventing death and injuries over the next decade. This study estimated that safety belts (at an 80 percent usage rate) could prevent 89,000 deaths and 3 million serious injuries over a ten year period. Safety belts were identified as the countermeasure superior to all other countermeasures. It is this kind of evidence which led one State highway safety official to state in a docket submission that "if there is a silver bullet in traffic safety, that (safety belt usage) is it" (67).

D. Constraints to Safety Belts and Child Restraints as Effective Countermeasures: Low Usage Rates

1. Background

The greatest constraints to safety belts (and child restraints) as effective highway safety countermeasures are the existing low usage rates. Either device is only effective when it is used and acceptably high usage rates have not been attained in the United States. A listing of major Federal efforts related to the use of safety belts and child restraints is as follows:

- o 1966 Lap belts required in passenger vehicles.
- o 1968 Lap and shoulder belts required in passenger vehicles.
- o 1973 Congress established incentive program for States to enact mandatory usage laws.
- o 1974 National Conference on Safety Belt Usage is held. Mandatory usage laws are endorsed.
- o 1974 Interlock systems required on all new passenger vehicles.
- o 1974 Congress repeals interlock rule and withdraws incentive program.
- o 1978 Congress requires States to allocate 2 percent of highway safety funds to safety belt usage.
- o 1978 Testing of child restraint devices required.
- o 1979 Series of child restraint and occupant restraint workshops initiated by NHTSA.
- o 1979 National Conference on Child Passenger Protection held.
- o 1980 NHTSA initiates second series of workshops designed to increase occupant restraint usage.
- o 1981 NHTSA establishes Task Force to plan and implements comprehensive program to increase safety belt and child restraint usage.

The most significant impact of any prior U.S. effort, relative to increased usage of safety belts, resulted from the 1973 interlock rule which was followed by usage rates as high as 74 percent in 1974 model vehicles. Even though such usage rates (in 1974 model cars) dropped to 43 percent by mid-1975, a national belt usage rate of approximately 25 percent was attained during this period of time. Following the negative public reaction and the 1974 repeal of the interlock rule, usage rates have dropped steadily.

2. Current Usage Rates

The most accurate means for determining usage rates is through systematic observational surveys conducted throughout the nation. The results of such observations conducted for NHTSA by Opinion Research Corporation (98, 99, 100) are shown in Figure 9. Usage rates prior to 1977 can be estimated from studies reviewed in a 1980 report by the University of Michigan Highway Safety Research Institute (143). Basically, these studies suggest that usage rates for drivers and front seat passengers were in the 15-20 percent range, from 1970-72. Such usage peaked at approximately 25 percent in 1974 and has been declining steadily since that time. While current driver usage rates appear to be in the 11-12 percent range, usage rates in some areas (such as the west coast) are considerably higher. For example, the most recent observed usage rates for drivers in Seattle, Washington were 26 percent.

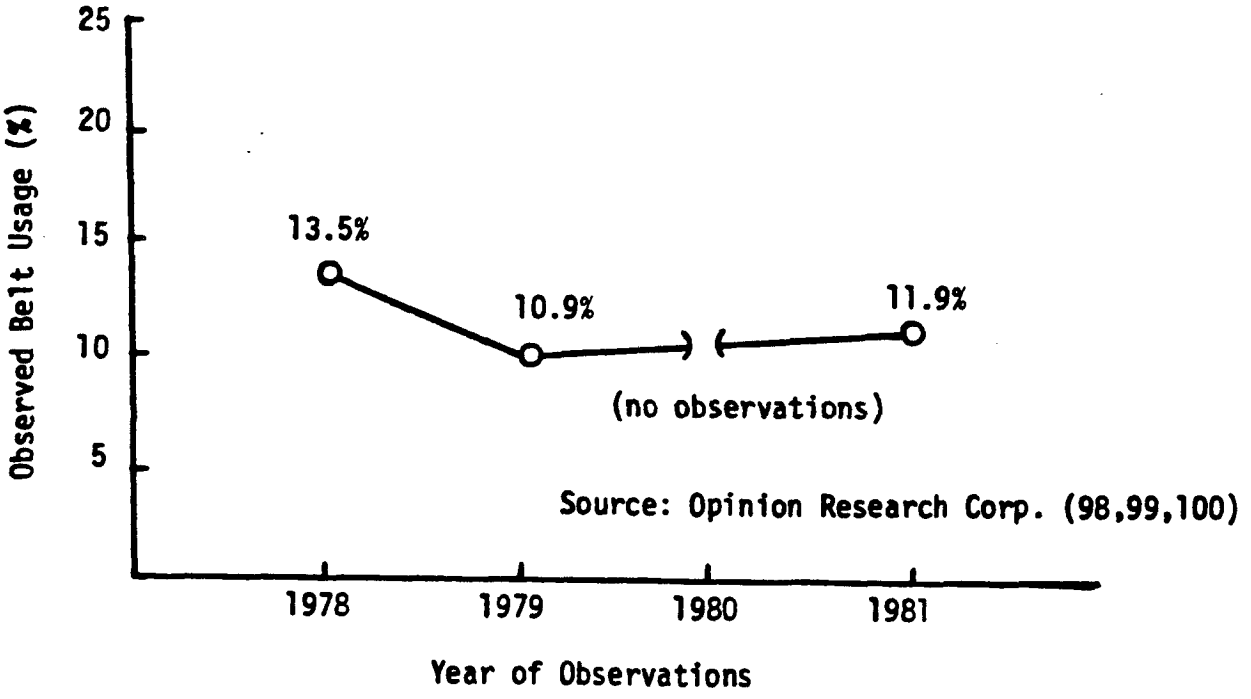


Figure 9
Estimated National Safety Belt Usage Rates
(For Drivers)

No observational data was obtained for the period from November 1979 to November 1980. What is apparent from the existing data is that up until November of 1979 (and possibly into 1980), belt usage was at a steady decline. The most recent survey results suggest that the decline has stopped and that usage rates may now be on an increase. This would be expected on the basis of at least two factors: (1) increased State activity in the safety belt (and child restraint) area since 1979; and (2) the ever-increasing proportion of down-sized vehicles in the traffic mix.

The increased State activity also results from a combination of additional factors which include: (a) the 1978 Congressional mandate that the States spend a minimum of 2 percent of their highway safety funds on safety belts and child restraints; and (b) the 1979 and 1980-81 series of NHTSA State and Regional Workshops in this area.

The fact that the activity of the States has increased dramatically in the child restraint area is born out by the increased resources allocated to this area since 1978 (less than $1 million in 1978 versus $5 million in 1980). In addition, recent NHTSA surveys have suggested a substantial increase in the proper use of child restraints since 1979. Furthermore, these surveys have shown a doubling of child restraint usage by toddlers (age 1-4). Figure 10 shows the usage rates by age group for 1979. Figure 11 shows the increase in infant and child restraint usage from 1979 to 1981 (98, 99, 100).

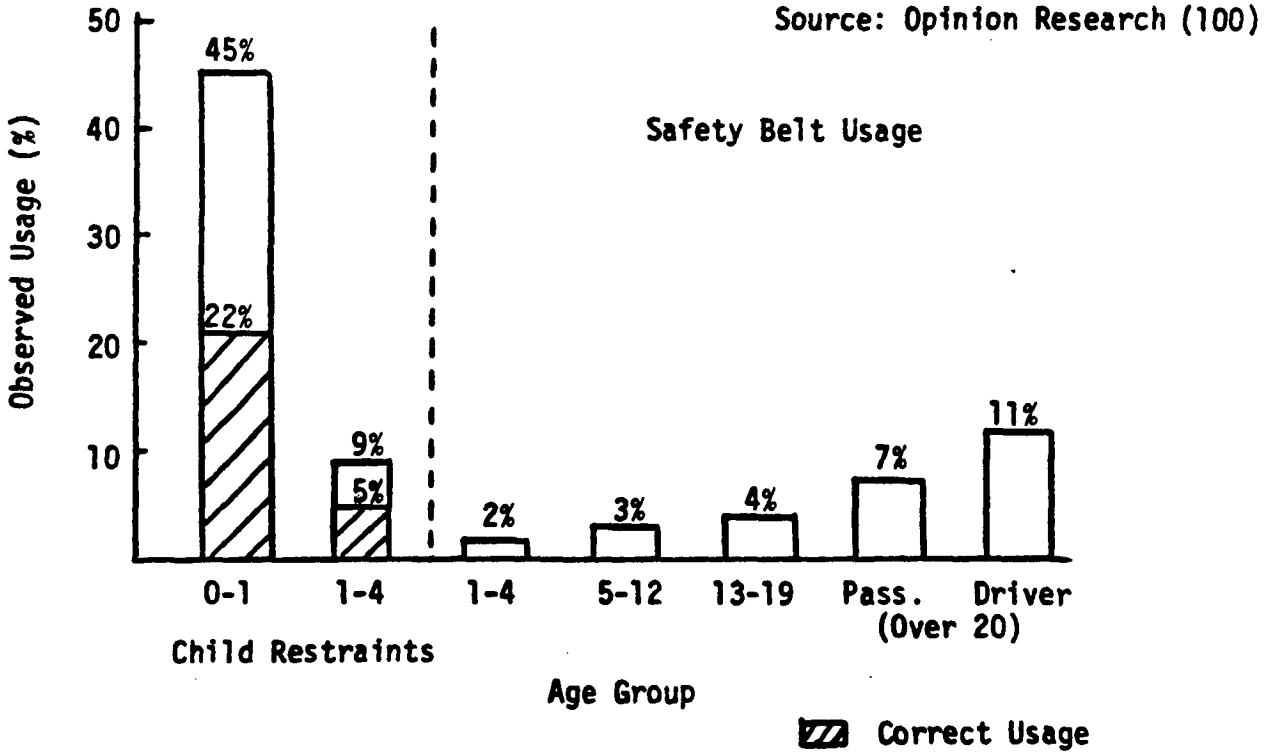


Figure 10
Restraint System Usage by Age Group

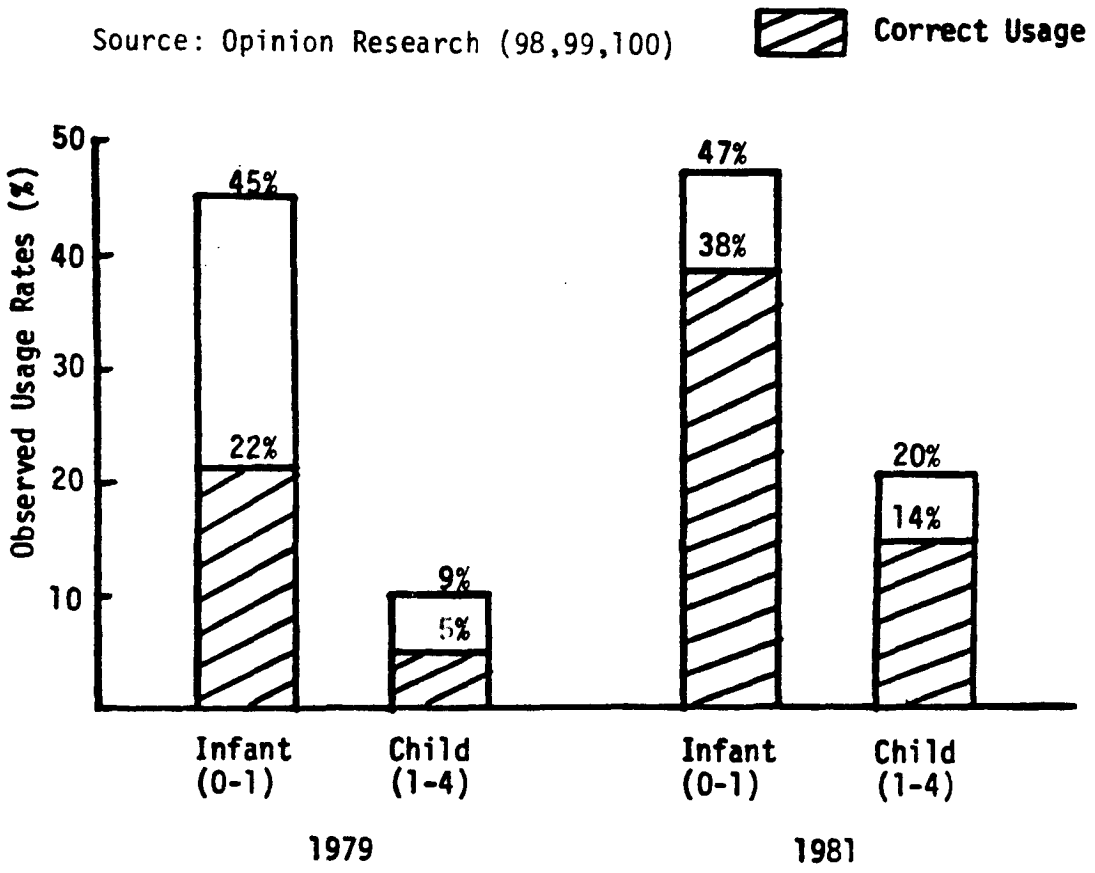


Figure 11
Change in Use of Infant and Child Restraint Devices

Thus, it is clear that with: (a) 11 States having passed child restraint legislation and more in the making; (b) an ever-increasing number of child restraint loaner and education programs in existence; and (c) a recent increase in child restraint usage, this is one countermeasure area which is receiving considerable attention by the States. It is interesting to note that many of the higher usage rates have been observed in States which have not yet passed child restraint legislation.

3. Child Restraints

The constraint of low child restraint usage has been nearly as substantial as that of low safety belt usage by adults. As figures 10 and 11 show, child restraint usage for infants (age 0-1 year) is reasonably high (nearly 50 percent) but involves considerable incorrect usage. After age 1, usage drops

off dramatically with only about 20 percent of children age 1-5 being restrained. Again, incorrect restraint usage (although reduced substantially in recent years) remains a major problem.

Incorrect usage, next to non-usage, is perhaps the second most formidable obstacle to the effectiveness of child safety seats in reducing death and injury. Other constraints, such as the misconceived notion that a child is safe in a mother's arms, (or in an untested child seat); a general lack of information about the need for child safety seats; and the costs of a child restraint provide some of the major reasons why usage rates have not been higher.

4. Motivational Research Findings Concerning Safety Belt Usage and Non-Usage

In order to get a feel for how the public feels about safety belts and the reasons why people do and don't wear belts, it's necessary to look at the motivational research which includes both telephone and face-to-face surveys. Some of the most significant of those studies which have been conducted in the past decade include:

- o 1971 National Analysts (85)
- o 1973 Fhaner and Hane (33, 34)
- o 1976 Yankelovich, Skelly and White (162)
- o 1977 Market Opinion Research (78)
- o 1981 Tarrance and Associates (134)

For the purposes of this paper, it seems appropriate to concentrate on the most recent surveys which are the 1977 Market Opinion Research Survey conducted for General Motors (78) and the 1981 Tarrance and Associates Survey conducted for the NHTSA (134).

a. Proportions of user types.

The 1977 study by Market Opinion Research (MOR), involved a national probability sample of approximately 1500 face-to-face interviews (78). It found the following distribution of belt user and nonuser types:

- o Confirmed users (18 percent)
- o Moderate users (28 percent)
- o Nonusers (51 percent)

The MOR research suggested that primary inroads might be made by concentrating on the moderate user since a belt-use habit has already been partially established. The study suggested that most of the 28 percent of moderate users could be converted to confirmed users by a successful program and that as many as 10 percent of current nonusers (or infrequent users) could be converted to moderate-user status. An upper limit usage rate projection of 46 percent (reported frequent use) was suggested by the study.

The 1981 study by Tarrance and Associates (134) involved a national probability sample of 1200 telephone interviews. It found the following distribution of user types:

- o frequent users (22 percent)
- o sometimes users (38 percent)
- o infrequent users (40 percent)

These researchers broke the population down further into the following subgroups, based on responses to key questions concerning their usage rates and their attitudes towards belt use:

- o Frequent users (confirmed) (22 percent)

- o Sometimes users (likely to change) (26 percent)
- o Infrequent users (likely to change) (22 percent)

- o Sometimes users (unlikely to change) (12 percent)
- o Infrequent users (unlikely to change) (18 percent)

Like the MOR researchers, the Tarrance group suggested that most progress could be made by concentrating program efforts on the "infrequent" and "sometimes" users who are likely to change. Further, these researchers suggested that Americans are not strongly polarized on the issue of belt usage. The failure to wear safety belts was generally not found to be a well thought out, cognitively justified behavior pattern.

The Tarrance researchers also found that the American public feels strongly that the driver is responsible for the safety of passengers in his or her car. Most respondents (89 percent) indicated that they would fasten their belts if asked to do so by the driver.

This closely parallels the findings of the MOR study where driver authority, driver responsibility and driver-to-passenger interactions, were found to be most powerful factors in increasing the belt use of both the passenger and the driver.

Both studies also suggested that Americans would fasten their safety belts if there were economic incentives to do so. In the Tarrance study, 84 percent of those interviewed said they would wear their belts if there was a reduction in their insurance premium for doing so. The MOR researchers also suggested

that insurance rate reductions would be powerful incentives for safety belt usage.

The MOR study also found that there were three important events when people generally experienced greater safety belt usage behavior. They were:

- o during adverse weather conditions;
- o after buying a new car; and
- o after formal driver training.

Finally, the MOR researchers conducted both factor and path analyses and developed models for increased safety belt usage. In addition to the upper limit estimate of 46 percent (reported frequent) usage which has already been mentioned, the study provided estimates of the effectiveness of successfully addressing each of several factors concerning safety belt usage. These estimates are shown in Table 6.

Table 6
Estimates of the Effectiveness of Addressing Various Factors in a Safety Belt Usage Program

Factor	Percent of Drivers Becoming Confirmed Users
(1) Establish belt use at start of trip (e.g., fasten belt as part of start-up procedure).	5.9%
(2) Reinforce drivers as responsible and in authority to request safety belt usage.	5.3%
(3) Increase positive attitudes toward necessity of safety belt usage to be a safe driver.	4.5%
(4) Decrease fear of entrapment	1.4%
(5) Alleviate perceptions of discomfort and inconvenience.	1.4%
Total	18.0%

Source: Market Opinion Research (78)

To the factors listed in Table 6, the MOR researchers further suggested that (a) fully developed belt use modules in driver education courses and (b) the downsizing of new vehicles would add to the above "conversion" estimates.

b. Correlates of Belt Use

All of the motivational studies listed at the beginning of this section have identified characteristics which are associated with user groups and with

usage. Below is a summary of the most frequently found correlates of belt usage:

- o higher education
- o long trips/highway driving
- o driver education
- o smaller vehicles
- o health concern
- o purchase of new car
- o comfortable/convenient belt system
- o West Coast driving
- o Metropolitan area
- o Women (NHTSA Surveys)

Generally, demographics have been found to predict little safety belt usage (78). However, some of the above characterics and/or conditions can likely be capitalized upon in order to increase safety belt usage among similar (and different) populations.

c. Reasons given for not wearing belts

Throughout the past decade of motivational research, (11, 14, 33, 34, 50, 54, 63, 78, 85, 134, 162) the most frequently cited reasons for the nonuse of belts include:

- o inconvenience
- o discomfort
- o laziness
- o fear of entrapment
- o forgetfulness

Most practitioners in this area feel that while the above are the most often cited reasons given for nonuse, they may also be excuses. Other factors which are thought to be involved include:

- o perceived low probability of crash involvement.
- o lack of understanding of what really happens in a crash and how belts can help.
- o not a habit established early in life.

The two recent motivational studies found similar reasons given for not using safety belts. The MOR study went further and factor-analyzed the reasons given for belt nonuse (or use). The most important factor which came out of this study (and accounted for 43 percent of the belt-use variance) was

labeled "safety belt affect" (attitude). This factor consisted of a group of feelings and attitudes towards belts ranging from persons who felt that "it was an excellent habit to wear safety belts" and "using safety belts indicates good judgment" to persons who felt that "belts aren't worth it" and "with padding and other safety features there is no need for belts." The actual factor loadings for the major statements which contributed to this attitudinal factor were as follows:

	STATEMENT	FACTOR/LOADING
o	excellent habit to wear belts	+.81
o	using belts indicates good judgment	+.80
o	using belts prevent injuries	+.73
o	driving feels more secure with belts on	+.73
o	belts aren't worth it (low probability of crash)	-.70
o	no need for belt with other safety features	-.67
o	rather not think about belts.	-.64

About 30 percent of the respondents held negative attitudes towards safety belts. As expected, 75 percent of such negative attitudes were held by nonusers. Table 7 shows the distribution of attitudinal dimensions for each user group. Figure 12 shows the relationship between such attitudes and safety belt usage for the total respondent group.

Table 7
Attitudinal Dimensions by User Group

Attitude	Base	Confirmed Users	Moderate Users	Non-Users	Missing Data
Positive	(562) 100%	32%	33%	31%	4%
Neutral	(622) 100%	12%	34%	51%	3%
Negative	(482) 100%	9%	15%	75%	1%

Source: Market Opinion Research (78)

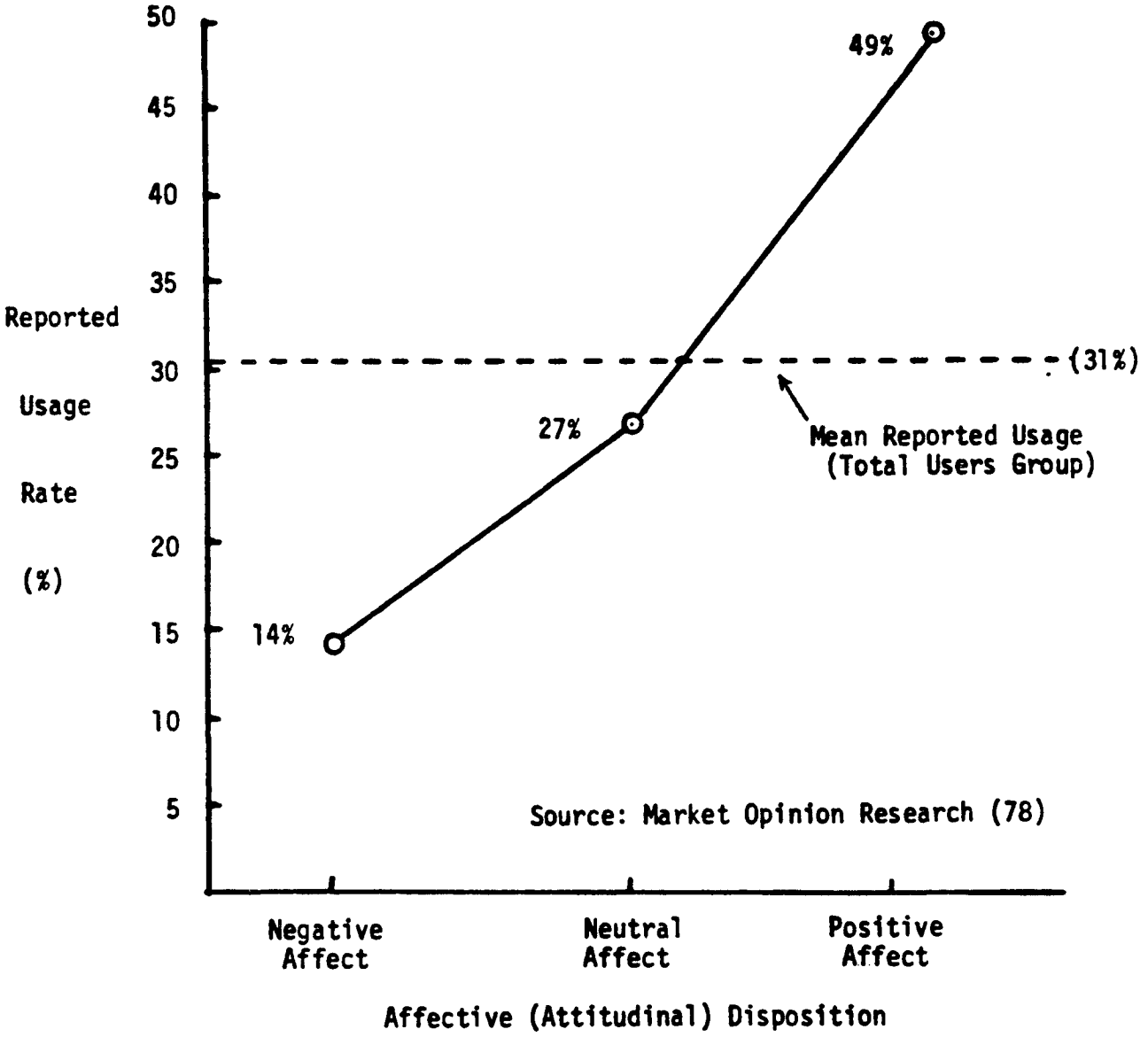


Figure 12
Reported Safety Belt Use As A Function of Belt Use Attitude.

Nearly all safety belt usage motivational studies have found fear of entrapment to be a major reason given for nonuse of belts. Among the many myths and misconceptions about safety belts and their effect, fear of entrapment stands out from the rest.

Again the MOR study found this attitude most frequently held by nonusers. Table 8 shows the distribution of this fear of entrapment attitude across the various user types. Figure 13 shows the relationship between reported usage and fear of entrapment.

Table 8
Fear of Entrapment by Use Groups

Attitude	Base		Confirmed Users	Moderate Users	Non-Users	Missing Data
Do not fear entrapment	420	(100%)	27%	29%	41%	3%
Neutral on entrapment	648	(100%)	18%	30%	50%	2%
Fear entrapment	599	(100%)	12%	26%	59%	3%
Total Mean	1,667	(100%)	18%	28%	51%	3%

Source: Market Opinion Research (78)

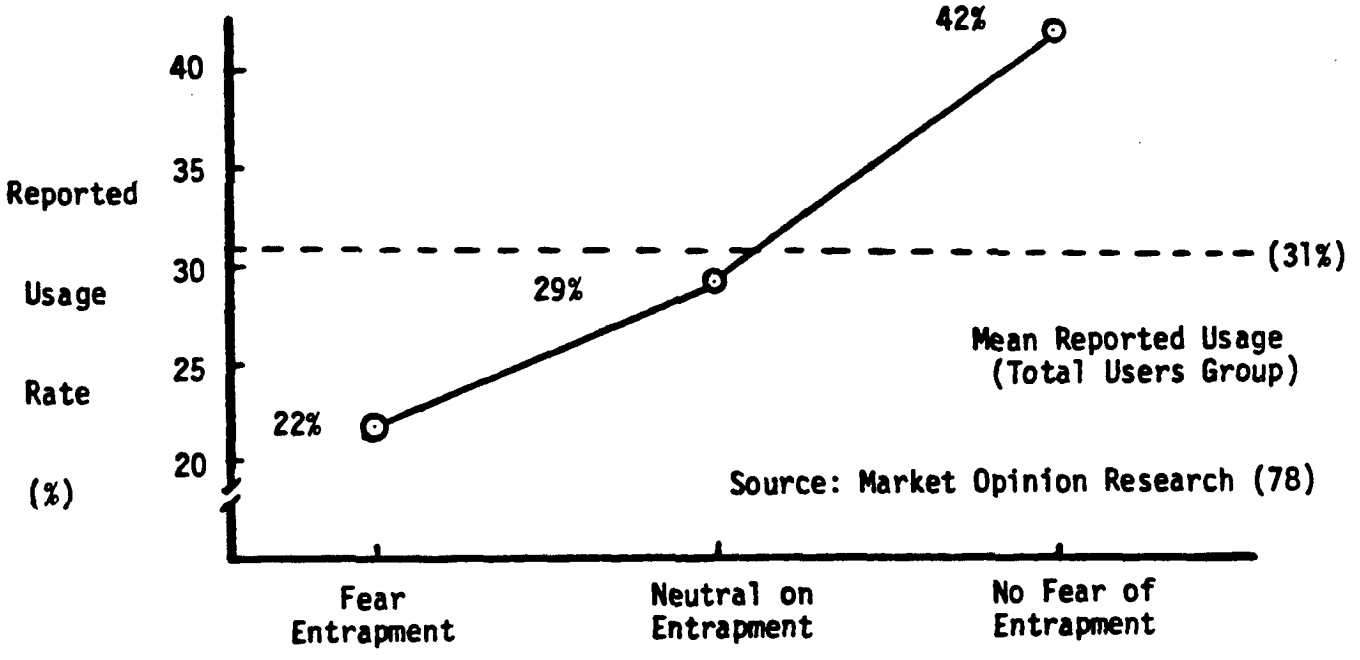


Figure 13
Reported Safety Belt Use As A Function of Fear of Entrapment Attitude

The most recent study by Tarrance and Associates also found fear of entrapment to be a widely held belief (134). In fact, as figure 14 shows, this fear was among the most prominent among reasons given for belt non-use.

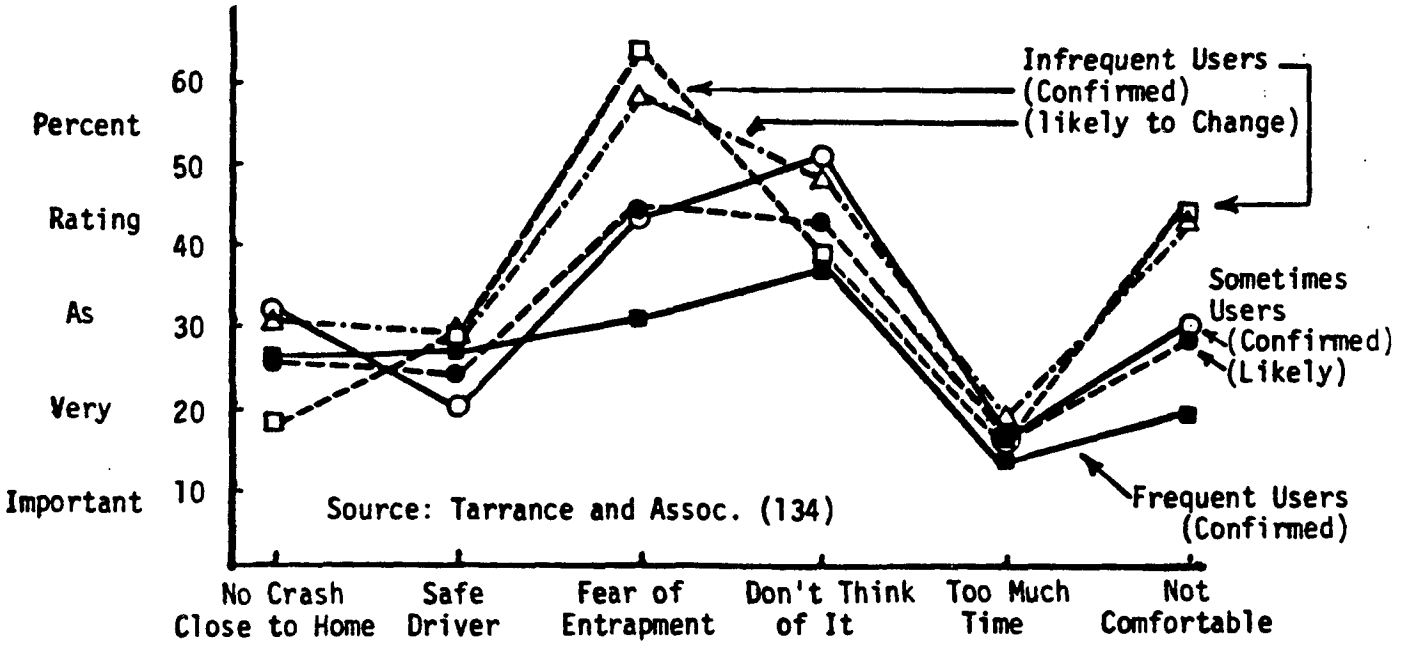


Figure 14
Reasons Given for Nonuse of Safety Belts

Finally, in this discussion of the reasons why people do not use their safety belts, a finding of the 1976 Yankelovich, Skelley, and White (62) survey should be mentioned. These researchers found that:

- o More than half of all drivers harbor considerable misinformation about safety belts and safety belt usage;
- o Only about a quarter of drivers had any knowledge of the benefits of safety belts in reducing deaths and injuries.

The findings concerning (1) the lack of firm opinions held about safety belt usage; (2) the vague and poor attitudes towards safety belt usage held by moderate, infrequent and nonusers; (3) the considerable fear of entrapment held by many user types; (4) the lack of understanding of how belts work, their effectiveness, etc. and (5) the strong findings relative to the potential for using driver authority as a motivator for safety belt usage, all point to the need for more effective public information and education programs in this area. These factors also suggest that if such programs can be put together which are sufficiently powerful to overcome the lack of knowledge and the neutral-to-negative attitudes towards safety belts, considerable progress can be made in increasing belt usage.

IV. Review of Program Approaches to Increase Safety Belt and Child Restraint Usage

The primary methods which are available to the States for increasing safety belt and child restraint usage include:

- o Public Information (mass media) Campaigns;
- o Educational Programs for Specific Target Audiences;
- o Child Safety Seat Distribution Programs;
- o Incentive Programs Which Reward Safety Belt Usage;
- o Organizational Safety Belt Use Policies; and
- o Safety Belt and Child Restraint Usage Legislation.

Program evaluation, while not specifically a countermeasure, is also necessary to maximize program impact by identifying effective (and ineffective) programs. A review of the characteristics, effectiveness, and constraints of these major approaches follows.

A. Public Information (Mass Media) Campaigns

1. Overview

Public information programs which depend on the mass media are generally composed of (1) public service announcements (or) "paid-for" announcements for radio and TV; (2) print advertisements for newspapers and/or periodicals; (3) billboards, posters, and bumper stickers; and (4) brochures, mailers, litter bags, etc. Such programs are (or should be) designed to:

- o Increase public awareness of an issue such as safety belt usage;
- o reinforce and lend "officialness" to the messages conveyed by means of other approaches; and
- o change public knowledge and attitude levels.

While mass media campaigns (used alone) have not been dramatically successful as methods to increase safety belt usage rates, there have been a number of programs which have resulted in significant increases in belt usage. The most frequent shortcoming of such campaigns, (in addition to not being accompanied by other approaches) is that they have usually been too brief to have any impact (33).

2. Foreign Experience

The inability of most media campaigns to greatly increase safety belt usage has been pointed out in a 1979 Task Force Report by NHTSA (71). This report pointed out that campaigns in (Ontario) Canada, Australia, France, and a number of other foreign countries were unable to get the majority of road users to buckle up, although most did manage to achieve usage rates in the 20-35 percent range. Some campaigns, which included other program components, have done even better.

a. The British Campaign(s)

Great Britain, was able to increase safety belt usage from 12 percent to 26 percent with a six-week television and print campaign (31). Later campaigns were able to raise the British belt usage rate to 30-35 percent, a level which they have been able to maintain with an annual public information effort. A further description of the British experience serves to illustrate the success of what was purely a mass media effort (103).

As indicated, in 1971 belt usage in Great Britain was 12 percent. This situation prompted the need for a campaign to inform the public via the media about the dangers of not wearing belts. A decision was made to contract with a commercial marketing firm to produce a series of television spots which would form the core of the campaign. This firm researched various appeals that might be effective with the British public, and fixed upon a series of interviews with accident victims during their recovery in the hospital.

A campaign was built around a series of mini-interviews conducted by a popular TV/sports figure with crash victims soon after their operations. Each of these interviews discussed the circumstances of the crash, using it as a case study to address the myths surrounding safety belts. Each commercial ended with the slogan: "Clunk-Click Every Trip" to remind passengers that the next sound they hear after closing the door ("clunk") should be the sound of their safety belt ("click").

Since 1972, the ad campaign has run every year for about six weeks per year. It costs slightly more than one million pounds ($2.5 million) each year. The Ministry of Transport estimates that during the six-week period, the advertisements reach 80-90 percent of the British public. They are shown 15-20 times each week and it is estimated that the average viewer sees one or another of the spots 8-9 times. The Ministry also printed large posters for use alongside the road and for the backs of buses in the cities. These posters illustrated the same individuals interviewed on the TV spots with the same messages. The campaigns have used newspaper advertisements and radio sparingly.

As a result of the campaigns, usage increased to about 26 percent after the first year, 28 percent the second, and has hovered between 30-33 percent since. This represents an increase over baseline of 116 percent, 133 percent, and 175 percent respectively with an overall increase of approximately 20 percentage points. The usage figures, as reported by the British Government (31, 31a, 103) are illustrated in Figure 15.

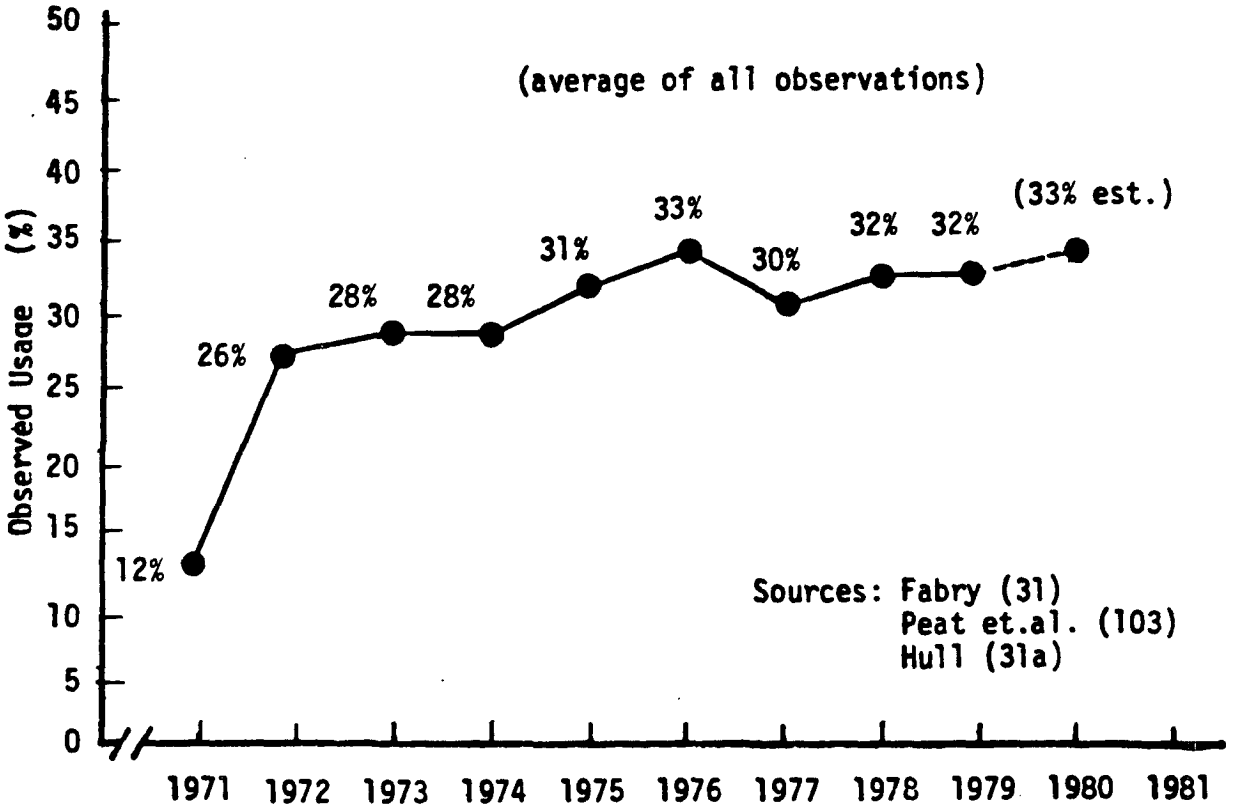


Figure 15
Effect of British Pubic Information Campaigns on Belt Usage Rates

b. The Swedish Campaigns

In Sweden, somewhat more comprehensive public information (and education) programs were undertaken. These were conducted in conjunction with well-designed belt usage studies to determine whether or not the public information efforts were having an impact.

Overall, the Department of Traffic Safety carried out a number of campaigns to increase the use of safety belts from 1971 to 1974. In addition, programs were organized by insurance companies, well known leaders of public advocacy groups, school authorities, and others. The mass media campaigns entailed the use of newspaper articles, radio and television information programs, and radio and television spots (30, 103).

Two types of studies were conducted to determine the results of the campaigns. First of all, national probability surveys were conducted which were based on statistical selection of time, place, and traffic flow ("representative"

studies). Secondly, random ("non-representative") surveys were conducted. The results from both of these studies showed a definite increase in the use of safety belts. The pre-(1971) and post-(1974) usage rates in Sweden are shown in Table 9 below.

Table 9
Pre and Post Campaign Usage Rates in Sweden

Roads	1971 (Pre)	1974 (Post)
Representative Studies		
o National Truck Roads	21.0%	34.0%
o Country through Roads	18.0%	29.0%
Random Studies		
o All Roads	15.2%	35.6%

Sources: Edvardsson and Degermark (30).
Peat, et.al. (103).

The Road Safety Office took much available research into account in developing their campaigns. An example of research considered was Bandura's theory of modelling, which states that learning can take place by direct observation of models who are seen as being important to the observer. Supported by this and other theories, interest was directed to a great extent to organizations, companies, authorities, and other small groups. These groups were urged to initiate activities of their own, led by leaders known within the organizations (30, 103).

In the first campaign, the Road Safety Office directed its materials toward private companies to get belt users to influence nonusers. The campaign material included a film and a "company package" with suggestions for activities to be conducted within the firm. In addition, fact sheets and informational material directed toward the police were produced.

In the second campaign, one of the efforts focused on schools. A figure called "The Belt Man" was created and used. His task was to remind motorists about the seat belt, but "being short of time" he asked pupils for their help. The students were give identity cards and "Belt Man" badges. In each group an attempt was made to reach peer leaders, who could influence other members of the group.

The greatest effort was expended in the third campaign. It was primarily aimed at organizations and companies, but greater emphasis was placed on incentives and rewards. For example, a safety belt pin was given to those promising to use the belt. Making use of radio, television, and the press, the campaign also incorporated what was called the "Bingo War." This program utilized bingo cards, with which it was possible to win cars, TV sets and other prizes. These cards were given only to people observed using their belts. Drawings took place on TV.

The fourth campaign was similar to the first and second. The fifth and sixth campaigns dealt primarily with injuries in urban traffic and included previously produced material as well. Women were focused on to a greater extent in the later campaigns, as a number of studies indicated that women tended to accept use of seat belts more than men and it was thus hoped that the women would influence the men.

Figure 16 shows the steady increase in belt usage which resulted from these public information (and education) efforts. From this figure it can be seen that belt usage rates increased from approximately 15 percent to 20 percent by the end of 1971; to 28 percent by the end of 1972; to 32 percent by the end of 1973; and to 36 percent by the end of 1974. These represent increases of 30 percent, 84 percent, 110 percent, and 136 percent, respectively. For a total increase of approximately 21 percentage points. Usage rates continued to rise to approximately 42 percent just before mandatory safety belt usage legislation was passed (30, 103).

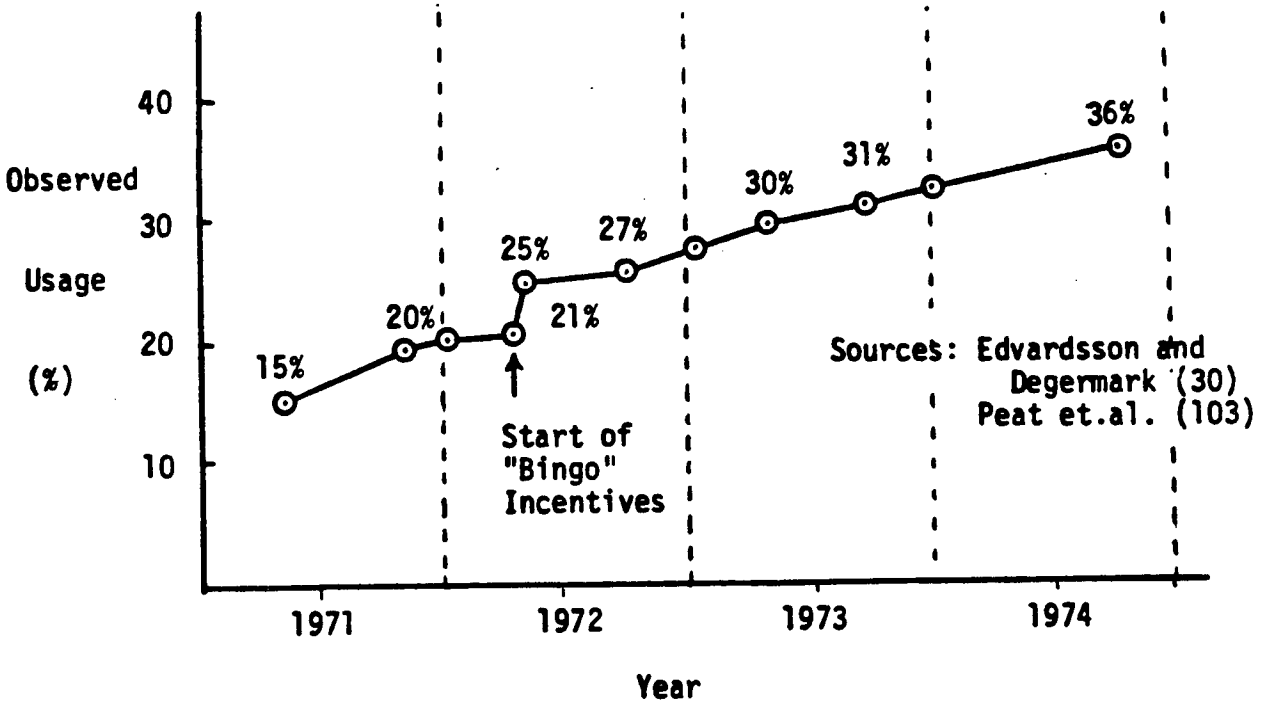


Figure 16
The Effects of Public Information Campaigns on Safety Belt Usage Rates in Sweden (1971-1974)

c. Other Foreign Examples

While the above in-depth examples provide an insight as to the types of campaigns which have resulted in usage rates greater than 30 percent, it must be remembered that there are many other foreign examples of moderately successful programs. Australia, France, the Netherlands, Norway, and Ontario, Canada all achieved usage rates in the 20-35 percent range before passing legislation. In many past reports (71, 95, 114) such results have been viewed from a negative standpoint since most of these nations went on to pass legislation which doubled or tripled usage rates. However, it should be remembered that:

- o most such public information programs were limited almost entirely to mass media;
- o such efforts generally doubled or tripled pre-existing baseline usage rates; and
- o in nearly all cases, the ability to pass safety belt legislation was attributed to the knowledge and attitude changes resulting from such media programs.

A summary of the estimated pre-legislation usage rates for several of these nations is shown in Table 10.

Table 10
Estimates of Pre-Legislation Usage Rates in Several Foreign Nations

Australia	28%	Netherlands	26%
Canada	24%	New Zealand	33%
Denmark	25%	Norway	36%
Finland	40%	Sweden	36%
France	24%	Switzerland	32%
Great Britan	33%	West Germany	34%

Note: Figures given are averages for overall rates based on data derived from several studies (7, 8, 71, 75, 103, 114, 163).

Overall, these foreign data strongly suggest that a usage rate in excess of 30 percent can be expected from a fully implemented voluntary safety belt usage effort.

3. The United States Experience

a. The Oakland County, Michigan Campaign

One of the first public information (and education) programs conducted in the United States was a three-month campaign conducted in Oakland County, Michigan, by the Oakland County Traffic Improvement Association (97). This program, while primarily a media campaign, also included some short term educational components.

The program was based primarily on the print media. The theme "It's lock it to me time" was based on a popular TV show character (Judy Carne). The theme was promoted via 104,000 brochures, 22,500 bumper stickers, and 5,400 posters. The population of Oakland County was 900,000 at that time.

In addition to the distribution of the above materials, a slide show depicting local accident case histories and the value of safety belts in saving lives, was developed and presented to approximately 30,000 persons (3 percent of the population) by means of a 35-person speakers bureau (4,000 exposed), major employers (20,000 exposed), junior high schools (4,000 exposed), Jaycees, Boy Scouts, Girl Scouts, and Campfire Girls (no exposure estimate given).

Other efforts were also included such as (1) Safety Belt Day and Safety Belt Week proclamations, (2) "Safety Bug" pledge cards given to elementary students, (3) a teenage safety conference featuring a "Miss Teen Lock-it," and (4) shopping mall exhibits. Apparently, no radio or TV spots were developed or used.

An evaluation of the extent to which the program reached and informed the public revealed that in a recognition test, 42 percent of those queried, recognized the slogan "It's lock it to me time" and understood its meaning. Recall tests resulted in much lower numbers. The results of the survey can be summarized as follows:

- 98 percent recognized NSC slogan "Buckle Up for Safety"
- 42 percent recognized campaign slogan "Lock It to Me."
- 19 percent recognized NSC slogan "What's Your Excuse?"
- Of those who recognized the campaign slogan 86 percent said that they believed in safety belts and 24 percent said that they always wear their belts.
- Of those who did not recognize the campaign slogan, 79 percent believed in safety belts and 29 percent said they always used them.

From these data it is apparent that, while a considerable portion of the population was "reached" (according to recognition test results), the program did not have a major impact in changing existing attitudes or behaviors.

This is probably due to the fact that the majority of persons were reached only by means of mass media. Here the project report suggested that:

- 35 percent saw the slogan on a poster
- 25 percent saw the slogan on a bumper sticker
- 18 percent saw the slogan on TV
- 13 percent heard the slogan on the radio, and
- 10 percent saw the slogan in the newspaper.

In order to evaluate the campaigns effectiveness in terms of increasing safety belt usage rates, surveys were conducted at 30 carefully selected intersections with in the county both before and after the campaign. The results of the surveys were as follows:

(1) Safety belt usage among Oakland County drivers increased from 17.5 percent to 20.8 percent. When applied to the number of licensed drivers in the county, the 3.3 percentage point increase represented 16,500 more belt users among drivers.

(2) Safety belt usage among Oakland County passengers increased from 11.6 percent to 12.1 percent. Translated into passengers, the .5 percent increase represented an additional 1,137 passengers to be wearing belts following the campaign.

While the gains in usage rates were obviously small, it must be remembered that, in spite of the efforts to reach target groups through small-group educational programs, only about 10 percent of the estimated 400,000 persons "reached" (or 3 percent of the total population) were reached through such educational programs. The majority (approximately 90 percent) were reached through mass print media only.

b. Motorists Information Campaigns (1977)

In the early part of April 1977, Motorists Information, Inc., initiated a campaign in the Grand Rapids, Michigan area to increase public understanding and awareness of the value of safety belts and to provide more positive attitudes toward safety belt usage. The initial campaign (70) was six weeks in length and utilized traditional mass media advertising such as television, radio, billboards, and newspapers. A theme entitled "Somebody Needs You" was developed on the basis of extensive motivational research. Radio and televison spots developed around this theme emphasized the loved ones who would be affected if an automobile crash were to claim one's life.

Basically this campaign was initiated as a precursor to a larger effort which was to follow. It was designed to determine whether or not a well-conceived and executed media program could result in a significant shift in attitudes toward safety belt usage. An evaluation, based on attitude shifts, was conducted. Using several indicators, this study found that public understanding and awareness of the value of safety belts did increase during the course of the campaign (70).

First, the reported use of safety belts (always or most of the time) went up from 29 percent to 41 percent (an increase of 41 percent or 12 percentage points). Second the proportion of people who thought "always wearing a safety belt" was the most important among a group of safe driving behaviors increased from 14 percent to 24 percent (an increase of 71 percent or 10 percentage points). The results of the study also indicated that the public information effort increased acceptance of safety belt legislation from 34 percent to 44 percent (an increase of 30 percent or 10 percentage points).

Based on the results of the first effort, a second campaign was conducted over a nine week period in the fall of 1977 in Southeast Michigan (84). Advertising included newspaper ads, outdoor billboards and bus posters, and several newly developed TV and radio spots. In addition, a public relations program, including a speakers bureau and appearances on local radio and TV talk shows, were initiated.

Overall, the final results of the nine week program indicated that safety belt usage increased from 12.4 percent to 16.8 percent (an increase of 35 percent or 4.4 percentage points). Initial usage rates (and rate increases) were greatest for: (a) women, (b) higher socio-economic drivers; and (c) drivers of newer vehicles. Usage rates in some areas went to as high as 42 percent. Results for various communities are shown in Table 11.

Table 11
Effect of Motorists Information Inc. Public Information Campaign on Various Communities in Southeast Michigan

Communities	Pre	Post	Point Increase	Percentage Increase
Franklin	20%	42%	22%	110%
Berkeley	19%	36%	17%	89%
Union Lake	22%	37%	15%	68%
Birmingham	22%	36%	14%	64%
Oak Park	15%	29%	14%	93%
Madison Hts	11%	25%	14%	127%
Dearborn	14%	20%	6%	43%
Livonia	16%	23%	7%	44%
Taylor	13%	16%	3%	23%
Sterling Hts	19%	20%	1%	5%
Warren	12%	16%	4%	33%
Gross Pts	18%	22%	4%	22%

Source: Motorists Information Inc. (84)

While the overall success of this project was modest, it is clear that certain elements of the population were reached and affected more than others. Considering the fact that the effort was nearly exclusively a mass media campaign and considering the fact that it was only 9 weeks in duration, the doubling of usage rates among some segments of the population is notable (e.g., from 20 percent to 42 percent in Livonia and from 11 percent to 25 percent in Madison Heights). However, the campaign was expensive as nearly $900,000 was spent on paid advertising.

c. Other Mass Media Efforts to Increase Safety Belt Usage

Two additional campaigns were conducted for the purpose of evaluating the effectiveness of mass media efforts on observed safety belt usage. In one study (37) conducted for NHTSA in 1971, the effectiveness of public service spots on radio and TV was studied. In this effort, three California towns were selected for observation. One (Salinas) received relatively high exposure of public service announcements concerning safety belt usage over a 5-week period. Another town (Modesto) received moderate public service time exposure. The third town (Bakersfield) was chosen as a control and received only normal public service time.

Pre-and post-campaign observations indicated that in the high exposure area (Salinas), safety belt usage in low speed situations increased from 10 percent to 14 percent (a 40 percent or 4 percentage point increase). This increase dissipated immediately following the completion of the public service effort. No increases were found for high speed situations and no increases occurred in Modesto which received "moderate" public service attention to safety belts. The results were further complicated by the finding of increased safety belt usage in low speed situations in the control town of Bakersfield (from 9 percent before the campaign period to 11 percent during the campaign period to 16 percent three weeks after the campaign). The study concluded that the public service compaign had no significant impact on safety belt usage rates.

A second study conducted by the Insurance Institute for Highway Safety (116) evaluated the effectiveness of cable television messages in terms of increasing safety belt usage. In this study, several quality television messages were developed and aired on one of two cables for a period of nine months. At least one spot was similar to those used in the British program. An average of more than 100 showings per month (or approximately 3 per day) was reported. Observational surveys of persons in the Cable A area (which received the messages) and in the Cable B area (which received no messages) revealed no differences in belt usage rates. The researchers concluded that the television messages, alone, had no effect on belt wearing behavior.

d. Media Campaigns to Increase Child Restraint Usage

Two examples of mass media efforts to increase child restraint usage can also be mentioned. The effects of both are confounded to some degree with the effects of legislation. However, in both cases the design of the programs allows some assessement of their impact.

(1) Tennessee

In the State of Tennessee, after passing child restraint legislation, a public information program was established to inform the public of the law and of the need for child restraints (105). Two public information plans (or approaches) were included: a basic State plan (BSP) and a comprehensive plan (CP).

The basic State plan (BSP) was a control condition involving the distribution of brochures informing parents of children under the age of four of the law and how they could protect their children. Stand-up posters were also designed and distributed with the brochures. Distribution was made to hospitals, doctors' offices, clinics, and other strategic places which parents with small children frequently visited.

The comprehensive plan (CP) was more substantial and included a mass media approach to inform the general public about the law and the need for child passenger protection. Public service announcements, news spots and talk shows on television and radio were used. Newspaper editorials and billboards were also used as part of the comprehensive plan.

The master plan for the study called for each target area to use the basic State plan (BSP) first. During each 6 month period, an additional target area would use the comprehensive plan (CP), until all target areas were included. A loaner program designed to provide child restraints to citizens who could not afford them was also implemented in two target areas.

Table 12
A Comparison of the Effects of Two Public Information Programs on Usage Rates in Tennessee

	Usage Rates (%) for Different Conditions			
Area	Baseline	BSP (average)	CP (average)	Overall Increase
Nashville	14.0		21.2	7.2
Memphis	10.9	13.5	19.3	8.4
Knoxville	12.8	20.4	23.6	10.8
Chattanooga	10.9	12.9	19.4	8.5
Tri-Cities	10.7	17.6	20.6	9.9
Urban Average	11.8	16.1	21.0	9.2
Nonurban Average	6.5	11.1	13.8	7.3
Statewide Estimates	9.2	13.6	17.4	8.2

BSP = Basic State Plan
CP = Comprehensive Plan

Source: Perry et al. (105).

In all target areas, usage rates were higher during the comprehensive program (CP) period than during either the baseline period or the basic State plan (BSP) period. Table 12 shows this. Overall, it appears that both programs may have had some impact on usage rates. However, any such effect is clearly confounded with the passage of the legislation and with the passage of time since the comprehensive program always followed the basic State plan.

(2) New South Wales, Australia

In New South Wales, a 1979 mass media effort was implemented to supplement passage of a 1977 child restraint law (38, 39, 40). Considerable motivational research was taken into account in developing themes, messages, and finally the television commericals which were used. Emphasis was also placed on the use of new "booster seats" to overcome resistance to the bulkier forms of child restraints. The campaign was reported to have raised overall usage rates of children under age 8 years from 40 percent to 55 percent, an increase of 38 percent or 15 percentage points. However, incorrect usage, (a major problem in the child restraint area) also increased (40).

e. Mass Media Program Summary and Constraints

Media programs designed to increase safety belt usage have had moderate successes in foreign countries. The British obtained a 30-35 percent usage rate by means of a purely mass media approach. Other nations have also been able to obtain modest increases. In the United States mass media efforts have never been implemented on a national scale. Smaller scale studies have not been very successful in increasing usage rates. However, several efforts have resulted in significant attitude shifts and the Motorists Information Program in Michigan (70, 84) demonstrated that such efforts can result in reasonably large (20-25 percentage point) increases among some segments of the population.

There are many foreign and domestic indications that mass media programs can result in significant changes in attitudes towards safety belt usage (and safety belt legislation). In several nations, including Australia, Sweden, France, (Ontario) Canada, and more recently in Great Britian, it is clear that such programs did much to facilitate passage and implementation of safety belt usage legislation (7, 8, 71, 103).

However, mass media programs alone do not appear to be powerful motivators of belt usage behavior. If substantial usage rates are to be obtained in the United States, either more powerful, nationally scoped media efforts will have to be developed and implemented or (more likely) other approaches involving educational and incentive programs must be integrated into a comprehensive program including mass media. Such programs must have a longer duration than past programs.

B. Educational Programs (including Child Safety Seat Distribution Efforts)

Educational programs differ from mass media programs in that they are more comprehensive, and deal with smaller target groups in any single delivery. Where mass media programs involve brief messages delivered to many potential targets, educational programs are longer, more informative, more persuasive efforts delivered in small group settings (e.g., driver education classes).

Much potential for increasing safety belt and child restriant usage among specific target groups exists with education programs. In addition, making child safety seats available to the public by means of rental, loan, and discount purchase programs has proved to be one of the most popular program areas with child safety seat advocates. Unfortunately, in the safety belt area, too few promotional efforts have included educational programs. Nearly all past efforts to increase the voluntary use of safety belts have limited themselves primarily to the use of mass media. In the child restraint area, while educational programs for physicians, hospital, and new parents have been popular, most have not been objectively evaluated. Where educational efforts have been attempted, however, it has appeared that usage rates have increased modestly among the target groups exposed.

1. Elementary School Programs

a. Loudoun County, Virginia

In the United States, the NHTSA has developed a number of educational materials to promote safety belt usage among school aged children. Some of these materials include: (1) a safety belt "Fact Book"; (2) a booklet entitled "Teaching Children About Safety Belts"; and (3) a "Safety Belt Game." These materials were distributed to teachers in Loudoun County, Virginia schools (125). The teachers were asked to spend approximately 45 minutes per week (for a one-month period) in activities involving these materials. Each child was exposed to approximately 3 hours of safety belt activity over the one-month period.

Observational and interview studies were conducted before and after the program. The observational studies were conducted both in Loudoun County, Virginia and in a control (Prince Georges) county in Maryland. The results of the interviews indicated that about 70 percent of the students (age 6-11) discussed what they had learned with their parents. Students who were observed to be wearing their safety belts reported such discussions more frequently (81 percent) than non-wearers (68 percent). The proportion of children who said they wore their belts most or all of the time increased from 13 percent to 28 percent (an increase of more than 100 percent or 15 percentage points). The two most frequently given reasons for not wearing belts were "no real reason, don't think of it" (40 percent) and "uncomfortable" (20 percent).

The results of observational surveys indicated that actual belt use was much lower than reported belt use. However, actual use increased from 6.1 percent to 9.9 percent (a 3.8 percentage point increase). As figure 17 indicates, usage rates actually decreased in the control county.

While there was no observed effect on the belt usage of adolescents or adults in Loudoun County, the proportion of teachers who reported using safety belts either "most of the time" or "always" increased from 41 percent before the program to 76 percent after the program (an increase of nearly 90 percent or 35 percentage points). Most likely, these reported usage rates, like those for the children, are inflated. However, the reported increases are large and significant.

Source: Senk and Schwartz (125)

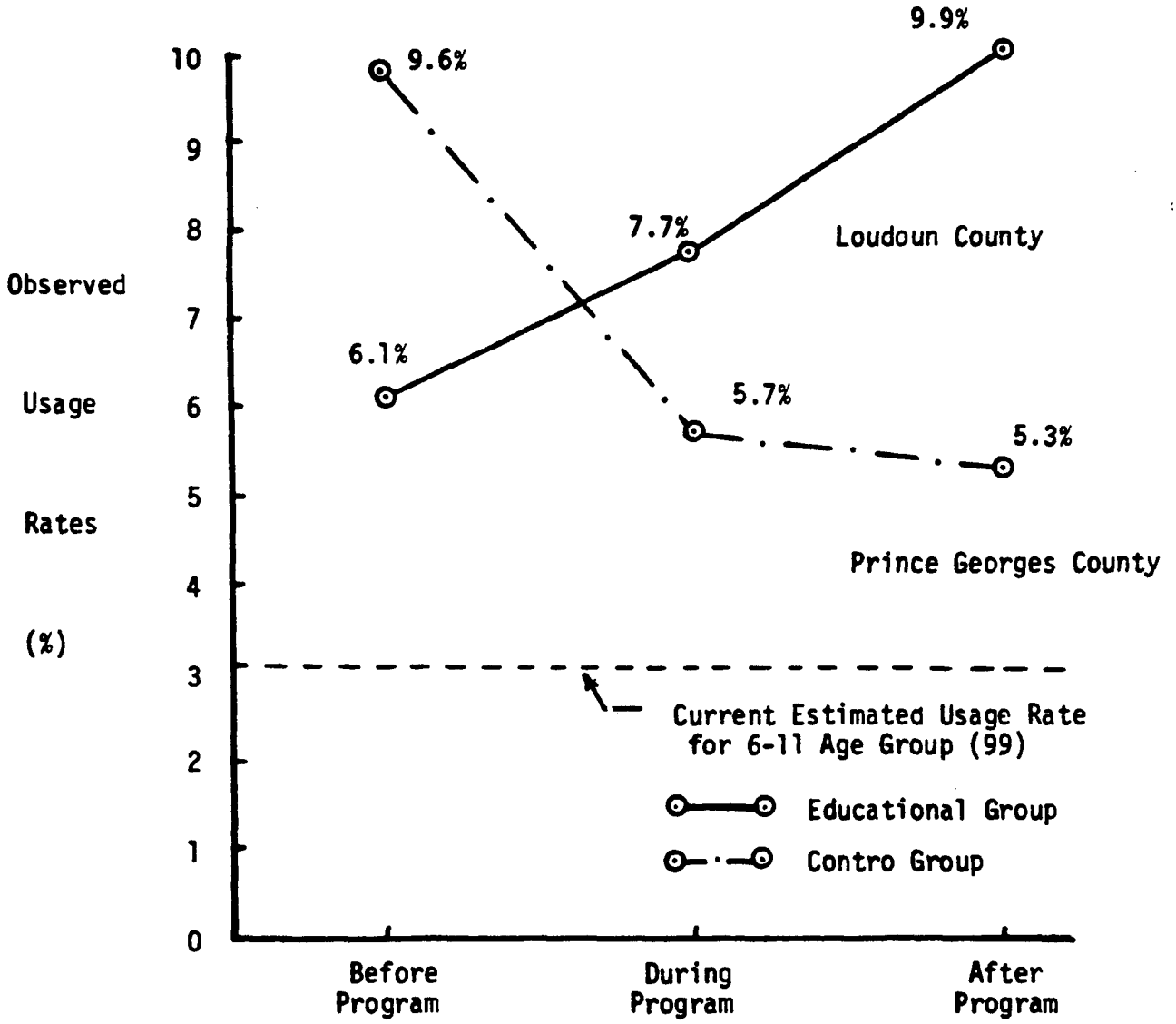


Figure 17
Safety Belt Usage Rates for Children Age 16-11 in Loudoun County, Virginia, and Prince Georges County, Maryland

Finally, a bumper sticker was also made available for each child and observed usage rates were noted for occupants of cars which displayed the sticker as well as for those which did not . As Table 13 shows, observed belt usage was greater for all age groups of occupants in cars which displayed the bumper sticker.

Table 13
Belt Usage in Cars with and Without Safety Belt Bumper Stickers Displayed

Age Group	Belt Usage: Bumper Sticker	Belt Usage: No Bumper Sticker
Adults	22%	8%
12-17	9%	4%
6-11	16%	4%
Under 6*	3%	1%

*Excluding children in car seats.

Source: Senk and Schwartz (125).

The failure to observe an increase in the safety belt use of adolescents and adults was not anticipated since a number of studies have suggested that safety belt (and child restraint) usage among children is usually accompanied by slightly greater usage rates among the parents of such children. In a Canadian study (4), for example, the safety belt usage of parents of elementary children exposed to a safety belt education program increased for up to six months following the program. Also, in Tennessee (105), the statewide safety belt usage of parents (with small children in their cars) increased from 3.6 percent before the Tennessee child restraint law was passed to 5 percent after the law was passed. The observed increase in urban areas was from 4.5 percent to 7.1 percent.

b. Statewide Programs

There are currently a number of elementary school safety belt education programs being implemented across the nation. Notable among these are programs in the States of Michigan, Missouri, Connecticut, and New Jersey which have distributed privately developed "Beltman" programs to a large proportion of elementary schools in the State. Also, in the State of Washington, extensive use has been made of the "K-12 Safety Belt Activity Guide" developed by the NHTSA. Few of these programs have been extensively evaluated. However, some States, such as New Jersey and Missouri have included evaluation activities as part of their on-going implementation (and educational) process.

1. New Jersey

The New Jersey Office of Highway Safety distributed "Beltman" educational programs to all of the 2,800 elementary schools in New Jersey. As part of the education program teachers used 30-day usage charts to monitor the belt usage behavior of second and third graders. It was felt that the responses

obtained from the 30-day chart for belt usage under various riding conditions were reasonably accurate because of the honesty of children at that age (7-9). Approximately 26 percent of the children indicated that they wore their belts always or most of the time during the program. Usage was highest on weekends and considerable interaction occurred between children and their parents (93).

2. Missouri

In another statewide program, post-program usage rates were even higher. In this program, the State of Missouri distributed the "Beltman" program to a number of elementary schools and conducted (reported usage) surveys before and after program exposure for approximately 500 third graders. The results indicated that the proportion who said they "always" wore their belts increased from 5 percent to 20 percent and the proportion who said they wore their belts "most of the time" increased from 13 percent to 26 percent. Thus, the proportion who reported usage of their belts either "always" or "most of the time" increased from 18 percent to 46 percent (an increase of more than 150 percent or 28 percentage points). The proportion who said they "never" wore their belt decreased from 47 percent to 21 percent (132).

2. Driver Education Programs

a. Survey Findings

The 1977 Market Opinion Research Study (78) indicated that persons who had taken formal driver training reported that they wore safety belts more frequently immediately following such training than they did at the time of the survey. This was in spite of the fact that the safety belt program elements in such classes has been quite minimal.

Supporting the potential for forums such as driver education to increase safety belt usage, a 1971 study conducted for the NHTSA (85) indicated that significantly more persons who have taken formal driver education training use belts than persons who have not. This finding is illustrated in Figure 18. The driver education group used belts 160 percent more frequently than those who taught themselves how to drive. Again, this is in spite of minimal emphasis on safety belt usage in most driver education courses.

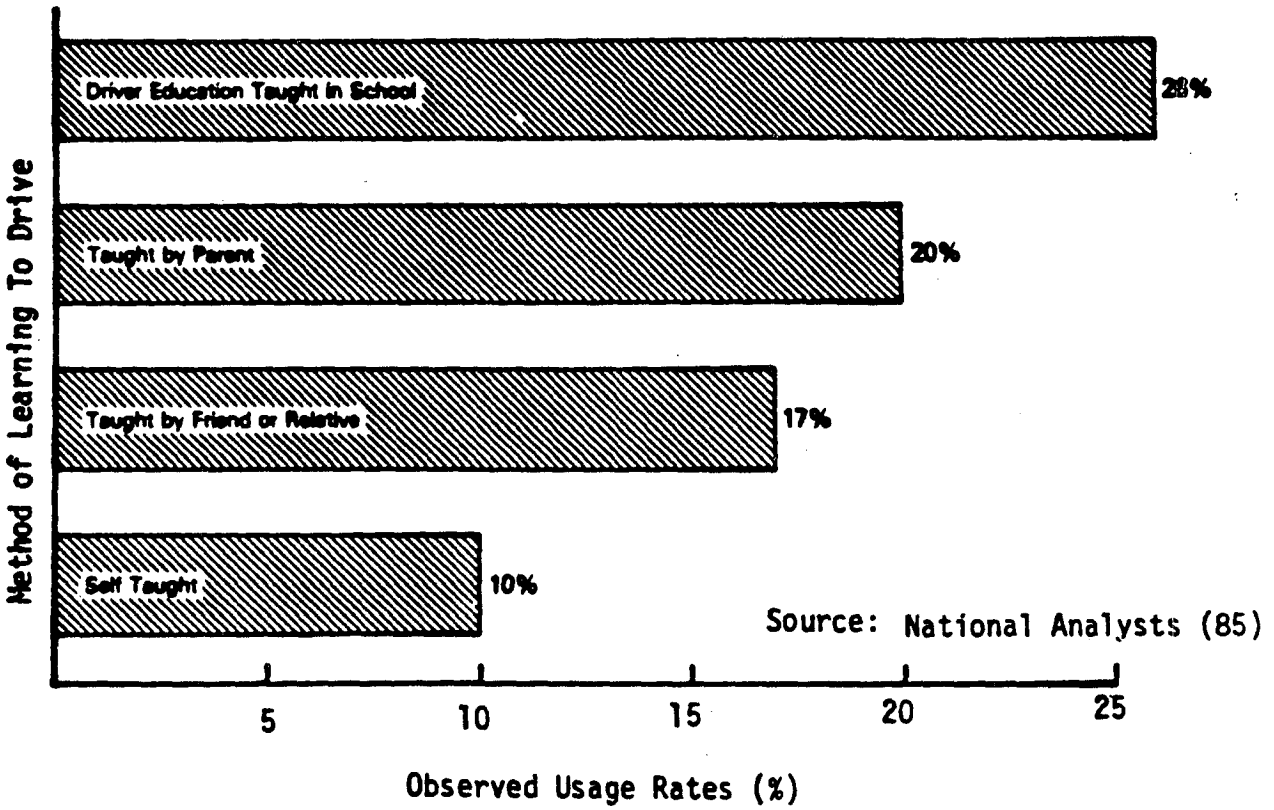


Figure 18
Safety Belt Usage as a Function of Driver Training Received

b. A Missouri Study

More recently a study was conducted in Missouri by the National Public Services Research Institute (NPSRI) to develop and test a safety belt supplemental program for a driver education course (86). The NPSRI researchers felt that the low usage of restraints among young people was due in part to the fact that they did not generally recognize the magnitude of forces involved in a crash. They felt that purely informational programs had not proved effective in the past but reasoned that belt use might be increased by a program that would not only provide information, but would also permit students to (vicariously) experience some of the effects of a collision.

Four programs were developed. The first program was an "information program," including only a basic information component. It contained an instructor's guide, a student's guide, and a film entitled "Dice in a Box." The student's guide covered what happens in a crash, how belts work, the effectiveness of belts and some of the excuses why people say they don't wear belts.

The second program was a "peer testimonial" program, which (in addition to the basic informational program) used a slide/tape presentation that permitted students to see the devastating long term effects of an accident on another young person and thus to experience such effects, at least indirectly.

The last two programs included direct experience, in addition to the informational program. One was a "vehicle program," in which students rode in an automobile taken through evasive maneuvers (belted and unbelted) and were able to actually experience the effects of vehicle motion and the protection afforted by belts. The other was a "convincer program," in which students road on a safety belt convincer and physically experienced the forces of a low-speed collision while restrained and protected by safety belts.

Knowledge and attitude surveys, as well as observational studies, were conducted for all four groups. The results indicated that each program had a significant beneficial effect in terms of increased knowledge scores, more favorable attitudes toward safety belts and increased safety belt usage. Table 14 shows the increases in belt usage that resulted.

Table 14
Effect of Four Driver Education Programs on the Usage Rates of Students Exposed

	Usage Rates			
Program	Pre	Post	Point Increase	Percentage Increase
Information	3.3%	8.5%	5.2%	157%
Testimonial	4.1%	6.7%	2.6%	63%
Vehicle	13.5%	26.7%	13.2%	49%
Convincer	9.0%	13.2%	4.2%	47%

Source: NPSRI (86)

Thus, increases in observed usage rates ranged from 3 to 13 percentage points. One program attained a usage rate of nearly 30 percent. The in-vehicle program appeared to be most effective in terms of the magnitude of the increase in usage rates which resulted.

c. A Texas Study

In another, less formally reported study, a graduate student at Texas A&M University attempted to assess the impact of a series of films, in conjunction with a high school driver education course, on students' reported belt usage (138).

The films used were those distributed by the NHTSA in the 1980-81 workshop series on occupant restraints. They consisted of several short films (2-8 minutes) which dealt with (1) the dynamics of a crash; (2) the effectiveness of lap and shoulder belts and (3) the myths surrounding belt usage.

Students anonymously responded to three different restraint device questionnaires during the driver education courses. The first was administered during the second class period of the course, which was prior to any restraint device instruction. After receiving classroom, multiple car training , and simulation instruction, the students were exposed to the audio-visual materials and then given a second questionnaire.

The third questionnaire was given on the last class day and followed a total of 32 hours of classroom, 8 hours of simulation, 8 hours of multiple car range, 3 hours of BTW, and 2 hours of emergency and evasive training.

The most interesting impact of the program was on the proportion of persons who stated that they "never" wore belts. This proportion decreased from 46 percent to 26 percent to 10 percent for the 3 questionnaires respectively. Reported usage by the end of the course was 90 percent. It is also interesting to note that 86 percent of the students felt that audio-visual package taught them the importance of belts.

3. A "Convincer" Demonstration for the General Public

A much earlier study tested the use of a "convincer" on the safety belt usage of fair attendees (62). In this study persons attending a local fair were solicited to observe and ride a convincer. Their attitudes towards safety belts and their reported belt usage were measured before and after riding the convincer and after a period of 2-4 weeks following the experience.

While the data collection method did not allow a determination of usage rate increases in terms of percentages, the results indicated that the safety belt convincer experience significantly increased seat belt usage during a variety of typical driving situations. All types of driving situations included in the test (e.g., in town, on long trips, on expressways, etc.) showed significant increases of reported safety belt usage after drivers had ridden the convincer. It was also concluded that attitudes concerning the effectiveness of safety belts were improved significantly. Finally, it was also reported that the safety belt convincer was a very effective public information device in that it created considerable public and media awareness and considerable discussion among fair attendees.

Two of the studies mentioned above (86, 62) suggest significant increases in safety belt usage as a result of simply being exposed to the safety belt convincer. Interestingly in the driver education study (86), the convincer program was less powerful than the others. This is being investigated further. At the very least, the convincer represents a powerful media attraction and should be considered for inclusion in any comprehensive public information program.

4. Educational Workshops for Adults

One other form of education is the educational workshop. Such media have proved to be successful methods to encourage increased participation in both the safety belt and child restraint areas. Several such workshop series have been conducted by NHTSA in recent years. Most of these were designed to increase safety belt and child restraint promotional activity among State safety personnel. Two such series were conducted in 1979, one designed to increase activity in the child restraint area (144) and the other to increase interest in the general area of occupant restraints (i.e., safety belts, child restraints and automatic restraints).

These two initial series of workshops were followed by three geographically separate follow-up series (i.e., East, Central, and West) designed to further promote activity in the area of occupant restraints and to disseminate audio-visual and print materials designed to help the States advocate such programs. The last three series were conducted during 1980-81.

Perhaps the best evidence for the effectiveness of the workshop series is the increased activity in the States relative to occupant restraint programs, especially in the child restraint area. A number of States including California, Colorado, Wisconsin, Minnesota, Florida, Mississippi, Iowa, and Utah have organized reasonably comprehensive child restraint programs as a direct result of the NHTSA workshop series. Some legislative bills were actually initiated and/or revised during or immediately following workshop sessions.

5. Child Restraint Educational Programs

There have been a number of examples of successful educational efforts in the child restraint area. Many of these are apparent in the legislative successes which have already occurred in 11 States. Legislation is not passed in areas such as this without considerable education of physicians, parents, and, of course, legislators.

In the more traditional role of education, however, there have also been some significant documented successes in changing child restraint usage rates. Two studies have been conducted by the Insurance Institute for Highway Safety (IIHS) to determine the effectiveness of various types of child restraint educational programs for new parents. In the first study (111) three separate approaches were used in a hospital setting. They included: (1) literature plus readily available infant carriers for purchase; (2) literature plus readily available infant carriers for purchase plus a personal discussion, and (3) literature plus the offer of a free child restraint device. To measure the effects of these programs, the use of child restaints by parents of all three groups was monitored both upon leaving the hospital and 2-4 months later as part of follow-up visits to the hospital.

The results indicated that all educational conditions increased the use of child restraints over a control (no education) group. The highest usage was obtained during the follow-up visits by the approach which included the

offer of a free seat. In this condition 41 percent usage was observed compared to 26 percent usage in the no education group (a 57 percent or 15 percentage point increase). The "literature only" and the "literature plus personal discussion" groups attained usage rates of 31 percent and 36 percent respectively. The differences between the four groups in terms of correct usage were not as great, however, with only the "free-seat" condition being significantly greater than the control group. Table 15 summarizes the results of the study.

Table 15
Observed Restraint Usage in Four Study Groups at 2-4 Follow-up Period

Study Group	% Correctly Using Proper Restraint	% Using Proper Restraint	% Using Improper Restraint	% Held in Someones Arms	% On Vehicle Seat
No treatment	(21%)	26%	29%	43%	2%
Literature only	(22%)	31%	19%	46%	4%
Literature and personal discussion	(20%)	36%	15%	48%	1%
Literature and free seat	(28%)	41%	6%	51%	3%

Source: Reisinger and Williams (111)

As is apparent from Table 15, the primary effect of the educational programs appeared to be one of lowering the proportion using an improper seat and increasing the proportion using a proper seat. There was little effect in terms of a reduction in the proportion of infants carried in someone's arms (on lap) and little effect (except in the "free seat" condition) in terms of increased use of the safety belt to properly fasten the child restraint.

In a second study supported by the IIHS, the effect of pediatricians' counseling to parents on infant restraints was evaluated (112). An experimental group received child passenger safety education during their post-partum stay and 1-2 months later during "well-child" visits. The educational program consisted of a discussion with the physician on how to protect infants in cars, a pamphlet on car safety, a formal prescription for a restraint and an actual demonstration by the pediatrician on the correct use of a restraint.

Figure 19 shows that while the education program did result in increased restraint usage over that of a control group (72 percent or 32 percentage points higher at the 2-month period) the differences between the two groups dissipated over time, primarily due to an increase in restraint usage by the control group (see figure 19). Restraint usage by both groups was very high (63 percent for the education group and 58 percent for the comparison group at 15 months). Correct usage was also very high (80-90 percent of total usage).

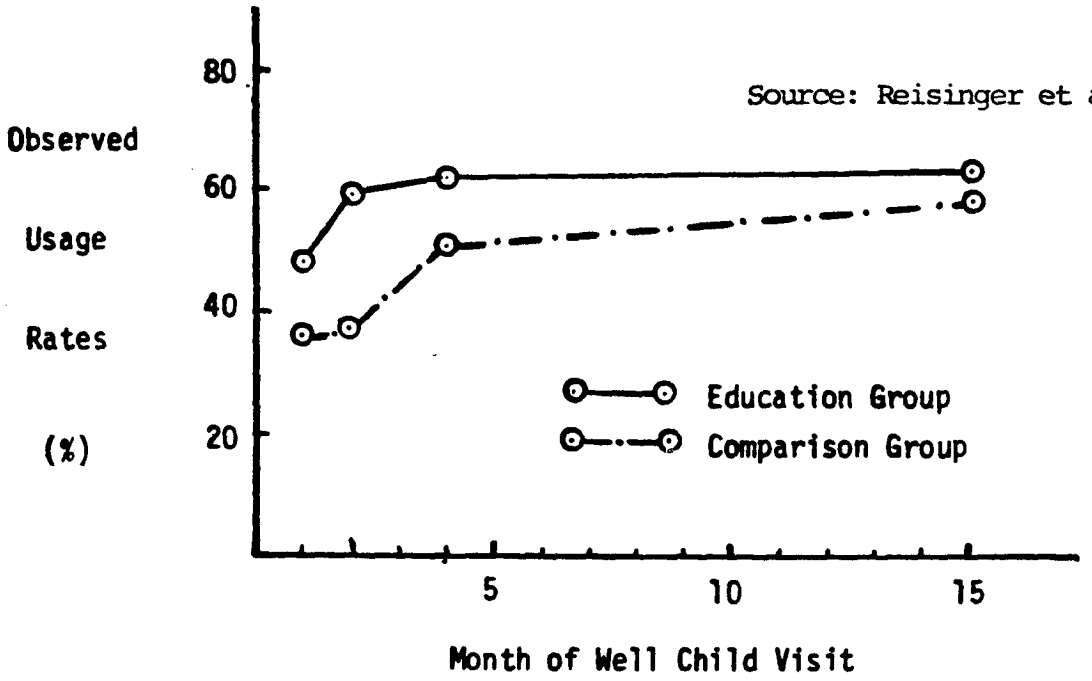


Figure 19
The Effects of An Educational Program by Pediatricians on Child Restraint Usage

In another study conducted in Seattle, Washington (4) researchers set out to determine whether or not a variety of educational programs could have an impact on the use of child safety seats by parents. This study found that the most extensive educational program, consisting of handout literature, exposure to a film and a demonstration on the use of child seats resulted in 60 percent of the parents exposed to the program purchasing a child restraint device. This was compared to a 37 percent purchase rate among a control group of parents (an increase of 67 percent or 23 percentage points).

6. Child Restraint Loaner and Rental Programs

The cost of a child restraint device has always been a major perceived obstacle to increased child restraint usage. That is why child seat loaner, rental, or discount sales programs are so important to educational attempts to increase overall child restraint usage.

In the State of Iowa, infant restraint educational packages were placed into the prenatal curricula of 60 hospitals, clinics, and maternity centers. Assistance was also provided to local groups resulting in the establishment of 104 infant restraint loaner programs. An infant restraint survey conducted in six major cities within the State (131) indicated that infant restraint usage increased from 10 percent in 1980 to 29 percent in 1981. This was an increase of 190 percent or 19 percentage points.

This type of observational evaluation data is most valuable from the standpoint of verifying the effectiveness and worth of education and loaner programs.

Again, such evidence is obviously bolstered by the fact that, nationally, child restraint usage has recently increased substantially. The fact that many observed increases have been in areas without child restraint legislation suggests strongly the worth and effectiveness of the education and child seat distribution programs. While to date, few of such efforts have been able to attain usage of such devices by the majority of the parents of child passengers, such prospects are much more probable in the near future, within a number of States.

To support this contention, the program implemented in the State of New Jersey is offered as an example. In this State an infant restraint program entitled "Do You Care Enough?" has been implemented in 59 hospitals in the State. In this program expectant mothers or new mothers in the post-partum period are exposed to a film strip which explains the need for proper infant restraints. A one-to-one discussion takes place with the new (or expectant) mother and a list of seats which have been dynamically tested and their availability is provided.

The number of new mothers exposed to the program in 1980 was approximately 38,500. By the time these mothers left the hospital, 60 percent had either purchased or were given an infant carrier. A telephone survey 30 days later indicated that 58 percent of the total sample of mothers reported "always" using an infant restraint (93).

7. Educational Program Summary and Constraints

The two most obvious constraints to the use of educational programs to increase safety belt and/or child safety seat usage are: (1) cost; and (2) the relatively small numbers of persons exposed to each delivery or presentation. The solution to both problems appears to lie with systematic efforts to solicit the support of large numbers of organizational networks to deliver safety belt and/or child restraint educational programs as a part of existing programs or as new programs delivered by volunteers. This activity is already well underway in many States with the promotion of infant and child safety restraints. Such networks of advocates have included pediatricians, organized volunteer groups called Child Passenger Safety Associations, Jayceettes, hospital associations, Red Cross Chapters, State and local PTA's, etc. It is because of the breath of organizations included in the child passenger safety educational movement that reasonably dramatic strides have been taken in recent years with verifiable impact in terms of increased usage of these devices

One other consideration must be made. Educational programs have a somewhat more predictable impact than do mass media programs. However, their effect when used alone, is generally not as dramatic as when they are acccompanied by other efforts such as incentive programs. Loaner, rental, and discount sales programs constitute incentives to use child restraints. Free-seat programs like those of some industrial companies (e.g., ARMCO) and insurance companies (e.g., League General) are greater incentives. In the safety belt area, lotteries, games, and cash rewards are all examples of incentives. Components such as these, in combination with educational efforts, appear to provide the best potential for achieving and maintaining substantial voluntary restraint usage rates.

Again, the need for educational programs for specific target groups is highlighted by findings of the Yankelovich, Skelly, and White Survey (162) that more than half of all drivers harbor considerable misinformation about safety belts and that only a quarter of drivers (have) any knowledge of the benefits of safety belts in reducing death and injury. The need is further highlighted by the findings of the Market Opinion Research Survey (78) that attitudes towards belts predict usage behavior better than any other single factor investigated. Finally, nearly every recent motivational survey has highlighted the prevalence of the unfounded fear of entrapment as the most widely held myth concerning belt usage. Educational settings offer the greatest potential for modifying such attitudes and fears.

C. Incentive and Reward Programs

Description

Incentives and rewards provide positive encouragements for increased safety belt usage. They can be offered to individuals, to organizations (e.g., employers); or to Governments (e.g., States). They are the primary means by which psychological researchers and practitioners seek to "shape" desired behavioral changes. Unfortunately, incentives and rewards have been virtually absent from past efforts to solve the real-world problem of low safety belt usage (and to a lesser extent the problem of low child restraint usage).

Instead, the current disincentives for safety belt usage include: (1) perceived discomfort and inconvenience; (2) negative peer image (among some groups); (3) discontinuance of noxious visual and/or auditory stimuli (e.g., buzzers); (4) unfounded fears that belts might trap one in a crash; and (5) a vague understanding that perhaps one might get involved in a crash and perhaps the belt will prevent the extent of one's injuries. This is not a very positive situation. Incentives and rewards must be explored in a number of settings and applied in a manner such that they compliment and maximize the impacts of other programs such as mass media, education, use requirement policies, legislation, etc.

1. Insurance Incentives

Insurance incentives offer a potentially powerful approach to encouraging an individual's (or an organization's) safety belt use. Such incentives can be applied (a) in the form of reduced premiums for belt wearers, and (b) in the form of increased coverage when belts are worn in a crash.

There are a number of reasons why any serious effort to increase safety belt or child restraint usage would want to seek the participation of property, life, and health insurance organizations:

- For one thing, insurance companies are in contact with a large majority of automobile drivers across the nation. With the exception of auto registration and licensing agencies, and service and repair businesses, it is difficult to think of an auto-related organization that reaches as many drivers as does the insurance industry.

- o Secondly, the insurance function can involve the driver in a very salient way; (through his or her pocketbook), by providing economic benefits to seat belt users, and by imposing added costs to non-users. When their insurance company talks, it's reasonable to expect that a large number of drivers will listen.

Auto insurance incentives can serve either as stimulators of new belt wearing behavior or as reinforcers of existing such behavior. In the past, companies have been reluctant to reduce premiums in exchange for a promise to wear belts because they do not want to be forced into the business of either monitoring belt wearing or of denying payment if policy conditions are not met. However, some companies offer reduced premiums for similar "committments" to safer or healthier behavior, like abstention from smoking or drinking.

Relative to rewards for safety belt usage at the time of a crash, some companies have recently offered double coverage limitations (on first person claims) if belts were worn. But this provision has seldom been advertised or used as a sales approach. A "straw poll" of agents for these companies indicates that most do not even know such provisions exist. Thus, any potential effects from such incentive policies have likely not been realized.

Many health insurance companies allow claims for expenditures for preventive medicine or for medical supplies obtained to treat a specific health danger. It should be to the same economic advantage of these insurance companies, as it is for automobile insurers like League General (of Michigan), to allow the purchase of a child restraint as a valid claim item (146). Health and Life Insurers are also in a position to offer reductions in premiums in exchange for belt wearing behavior. Such reductions usually apply only to first-person coverage. This includes only a portion of auto insurance policies but it includes all of the coverage for life and health policies.

Constraints to Insurance Incentives

The primary obstacles which have arisen in response to proposed insurance incentives have been: (1) the claim that premium reductions would be too small to provide an effective incentive; (2) the claim that it would be difficult to verify belt use (among policyholders or among crash victims); and (3) the assumption that increased coverage would seldom be realized and thus may appear to the public as a "sales gimmick."

These potential problems should not hinder attempts to make such incentives or rewards available to the public. Surveys conducted for the NHTSA have found that nearly 90 percent of the public interviewed say they would wear safety belts if they would receive an incentive such as an insurance reduction (134). Further, the majority of persons exposed to recent NHTSA "focus group" sessions on safety belt messages initially believed that such sessions were being conducted by insurance companies. The credibility of the insurance

industry in this area is substantial. It is likely that even a token reduction in premiums or increase in coverage would be seen by the public as an endorsement of the effectiveness of belts by an industry which depends on actuarial data for its existence.

The problem of verification of wearing rates also is not an insurmountable one. If a person says he or she is willing to wear a belt in order to get a premium reduction, that is a significant step forward. While such programs need to be tested, experience from other insurance programs suggests that a significant proportion of such persons will wear their belts and that the number of injuries prevented by such persons will compensate for any slight premium reduction provided to the total population of "professed" users. Policies for non smokers, non-drinkers and people who exercise provide some examples in other areas of insurance. Also, belt wearing in a crash is to a great degree verifiable by the types of injuries sustained (or not sustained) as well as by damages to the interior of the vehicle (e.g., the windshield). Finally, belts are now being made which can indicate whether or not they were worn in a crash.

2. Incentives to Employers

One of the primary incentives which can be given to employers to increase safety belt usage among employees is the provision of factual information pertaining to the prospect of reducing the employer's costs which result from injuries and deaths due to automobile crashes. The 1980 National Academy of Sciences Study (141) pointed out that:

> In 1978, for example, about one third of all work-related fatalities were caused by motor vehicle crashes. On the average, each such death cost the victim's employer $120,000. When on-the-job injuries are added to deaths, motor vehicle crashes directly and indirectly cost employers a total of about $1.5 billion in 1978. The employer cost of vehicle crashes off-the-job is estimated by the National Safety Council to be an additional $1.9 billion.

The Study recommended that the Federal Government should conduct studies to identify such costs and that such information should be more effectively conveyed to employers as an incentive to implement belt use policies.

An initial research effort by the NHTSA involves the pairing of similar types of crashes and comparing the injury costs for belt wearers versus non-wearers. The results have been impressive. In one pairing of nearly identical crashes (involving the same person in the same vehicle) the costs of the crash in the non-wearing situation were considerably greater than in the nearly identical later situation where the same victim was wearing a belt (151). The two crashes were rollovers at approximately the same speed. The costs due to injuries in the first (nonbelted) crash were estimated at $4,640. The costs due to injuries in the second (belted) crash were $160. This is a 29 to 1 ratio. It should be noted that the "belted" crash was the more serious of the two in terms of property damage.

Cost differentials vary in some cases by as much as $100,000 for a given pair of cases. Since costs increase geometrically as a function of injury severity, mitigation of injury tends to reduce employer costs far greater than the estimated 50 percent effectiveness of the belts in preventing injury. Table 16 shows another example of a typical comparison between an unbelted and belted driver in similar crashes.

Table 16
A Typical Comparison Between A Belted and A Non-Belted Driver Involved in Similar Crashes

	No Safety Belt Worn	Safety Belt Worn
Driver :	36 year old man	26 year old woman
Vehicle :	1980 Malibu Sedan	1974 Matador
Crash :	Driving 25 mph; sideswiped by tractor trailer on driver side; rotated clockwise	Driving 30 mph sideswiped by tractor trailer on driver side; rotated clockwise
Injuries:	Concussion crushed collar bone AIS-2	Contusions ligament strain AIS-1
After Effects :	stiff neck; dizzy spells	None
Time Off:	3 months	3 days
Employee Costs :	$11,298	$5.00

Source: Ware (151)

3. Incentives for Individuals

Perhaps the most important of incentives, from the standpoint of influencing an individual's belt use behavior are those which provide direct rewards to drivers and passengers for wearing belts or for purchasing and using child safety seats for their children.

Several programs have been attempted which have included positive incentives. In nearly all of these programs, other factors such as the presence of belt use policies and/or an educational program are also present.

a. Berg Electronics (A DuPont Subsidiary)

One such example is also mentioned in the "use-requirement policy" section of this paper and concerns the Pennsylvania based, DuPont subsidiary, Berg Electronics (9). The Company built upon an active on-the-job belt use policy of the parent DuPont Company. In this case, management concentrated on positive incentives in the form of small prizes to employees for observed safety belt use. Some of the individual rewards which were given included low cost items such as tire gauges, flares, stickers for batteries showing how to "jump start," etc. In order to encourage peer pressure, the company structured the program so that additional individual prizes could be obtained only if the entire plant reached an observed usage rate of 90 percent or better. These rewards included items ranging from toaster ovens to gardening equipment valued at approximately $15.00 retail.

On randomly selected observation days, employees who were wearing belts were given flowers to wear on their clothing, clearly identifying those who had not been using belts. Over a six-month period, the combination of the resulting peer pressure, the prizes and a strong public information program resulted in the achievement of the company's goal of 90 percent usage (from a base level of 50 percent). Usage remained at a high level, dropping to only 86 percent six months after the end of the formal campaign. The campaign costs were approximately $20,000, of which approximately $12,000 was used to provide the prizes awarded at the end of the program. Estimates of the savings from this campaign alone were over $45,000 in fatalities, injuries, and lost work days avoided.

b. Virginia Experiment(s)

Individual incentives have also been experimented with by a group of Virginia researchers (42, 43, 44, 45). Starting with experiments on campus and moving into the community and the workplace, these researchers demonstrated that relatively low-cost, positive incentive programs can bring about an increase in belt usage.

An incentive program was implemented in four area companies (43). At each site, belt usage was assessed daily at parking lot entrances when employees arrived in the morning and when they departed in the afternoon. The incentive program consisted of giving seat belt wearers educational fliers along with chances to win prizes (similar to the Swedish "Bingo" approach). The program, was implemented either during the morning (only) or during the afternoon (only) at any one particular plant. It used prizes donated by local businesses (e.g., a free meal at a local restaurant) as the use-inducing incentives.

The incentive program had the greatest impact at the plant which had the greatest degree of interest in safety and which showed the highest pre-treatment level of belt wearing (approximately 18 percent). At this plant, belt usage increased to an average of 57 percent (an increase of 200 percent or 38 percentage points) during the afternoon sessions when the incentives were distributed. Usage also increased to a mean of 28 percent during morning observations (when incentives were not given). This represents an increase of more than 50 percent or 10 percentage points.

A striking, differential effect of the incentive program was found at the two plants where the belt usage of both hourly and salaried employees was compared. The incentives had the greatest influence on the salaried workers. With hourly workers, a mean increase in belt wearing from 2.8 percent to 4.6 percent was achieved at one plant (an increase of 65 percent or 1.8 percentage points) and an increase from 1.9 percent to 9.4 percent was achieved at the other (an increase of nearly 400 percent or 7.5 percentage points). However, salaried workers (with higher baseline rates of belt usage) showed much greater actual increases in seat belt usage, (increasing from 17.9 percent to 50.6 percent in one plant (an increase of 180 percent or 33 percentage points) and from 14.7 percent to 28.6 percent (an increase of 95 percent or nearly 14 percentage points) at the second plant.

c. Non-Incentive Employee Education Programs

It is interesting to note that in another NHTSA experiment, (106) employee education programs (without incentives) failed to result in significant increases in belt usage. The implications of the study were that such educational programs would have benefited from the presence of either positive incentives or a use requirement policy in promoting increased belt usage rates.

d. Swedish Incentive Program

Perhaps the best, large scale example of the potential for positive incentive programs, combined with other public information and education efforts, is found in the previously reviewed Swedish program (30, 103). This program made use of "bingo" cards which were given to belt users and which allowed them to play games to win prizes such as TV sets, cars and other substantial prizes. Such incentives were clearly responsible for the immediate increase in usage rates which followed the initiation of the game (see figure 20).

Similar programs were responsible for much of the steady increase which followed in subsequent years of promotional programs. As can be seen from figure 20 usage rates in rural areas went from approximately 37 percent to nearly 60 percent following the initiation of incentives (an increase of 62 percent or 23 percentage points). On city streets usage rates increased from 12 percent to 25 percent (an increase of more than 100 percent or 13 percentage points).

Finally, in the child restraint area, incentive programs such as the loaner or rental programs currently being conducted in a large numbers of States, the discount sales programs run by the American Automobile Association and the "free-seat" program of the League General Insurance Company have clearly resulted in substantial increases in child restraint usage among those affected and have thus complimented media, educational and legislative efforts. Examples of 100 percent increases in local, State, and national usage rates have already been mentioned.

Sources: Edvardsson and Degermark (30)
Peat et al. (103)

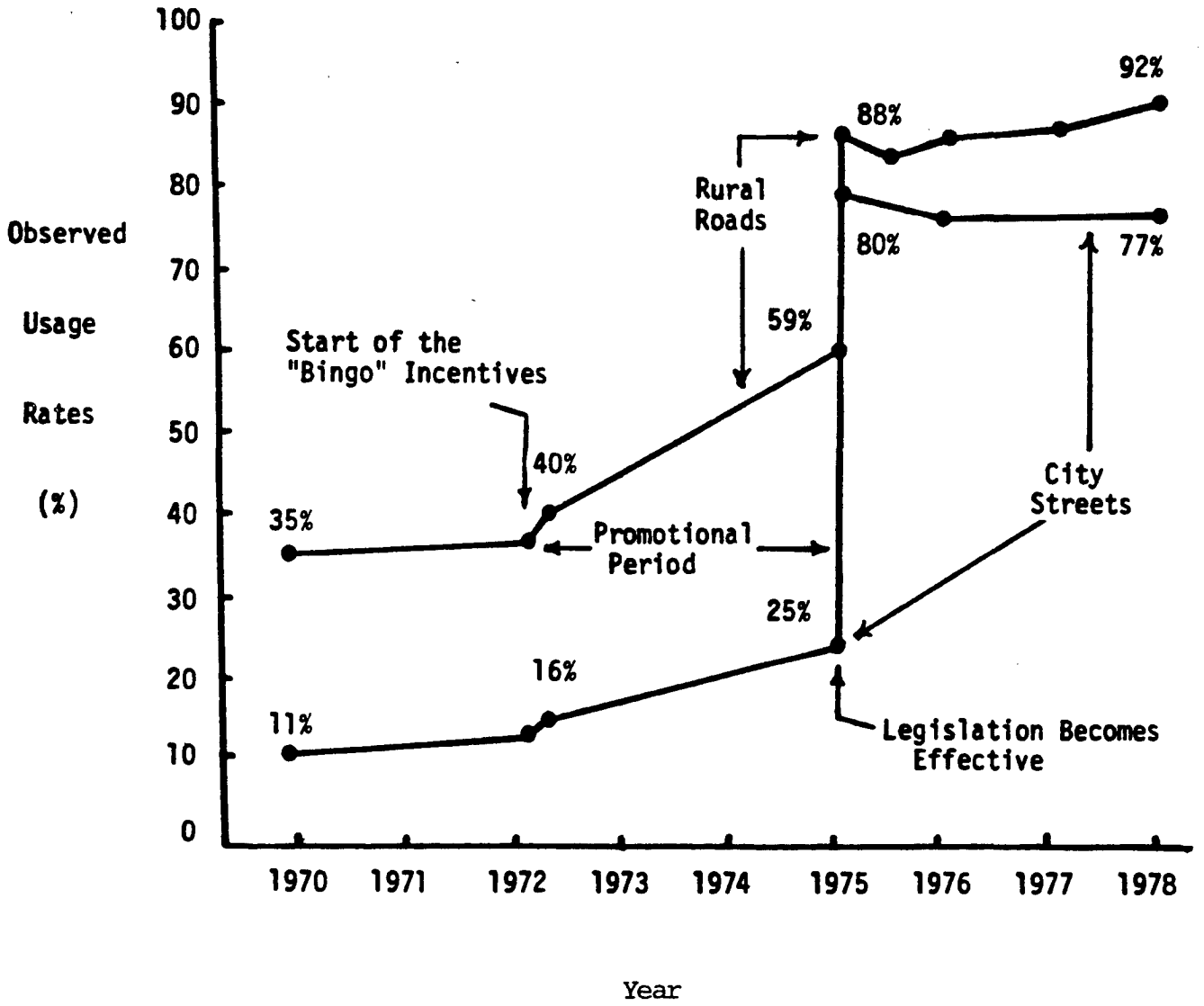


Figure 20
Safety Belt Usage Rates in Sweden Before and After the Initiation of Incentive Programs

4. Incentive Program Summary and Constraints

The primary constraints to incentive programs, as with educational programs are: (1) costs, and (2) implementing a sufficient number of such programs in a systematic fashion so that large numbers of persons can be exposed to them. The cost problem can be minimized by using prizes contributed by local businesses (as part of their ongoing public relations and advertising efforts). Such prizes can include merchandise, meals, entertainment, etc. In the Virginia Study (43) local businesses found this to be a very acceptable method of public relations and advertising.

The need for an organized systematic, nation-wide effort in order for such programs to have an impact again suggests the need for organized "networking" of educational enforcement, medical, health, and safety organizations, to name a few. Large numbers of existing organizations (including employers) must be approached and sold on the idea that (not only is it the right thing to do, but) it is a financially sound endeavor to attempt increase safety belt (and child restraint) usage among its members and/or employees by means of education and incentive programs.

Incentive programs are perhaps the most underused programs in the area of safety restraint promotion. There is sound experimental (42, 43, 44, 45) and epidemiological (9, 30) evidence which suggests that both voluntary and mandatory belt use programs will be more successful if they include the use of incentives and/or rewards. Usage rates as high as 90 percent have been obtained in employer programs (9), and overall usage as high as 40 percent has been obtained in a national program using incentives (30, 103).

D. Employer Belt Use Policies

Description

Employer programs which include company or Government policies requiring the use of safety belts while on official business, while in company vehicles, or while on company property represent another potentially powerful approach for increasing safety belt usage among a large number of segments within the total population. As such, it is an area which was also emphasized by the 1980 National Academy of Science's Methods for Increasing Safety Belt Use report (141).

In the report, the Academy recommended that the Federal Government should provide the lead in this area by requiring all employees to wear safety belts while on the job and encouraging them to wear safety belts at all times. The Academy further recommended that the Federal Government should conduct studies to determine the cost of the non-use of safety belts in crashes and provide such information to employers as an incentive to develop employee belt use policies.

Finally, the NAS report recommended that employers should require on-the-job safety belt use by employees and that insurance companies should be encouraged to recognize the risk reduction potential of safety belt usage in their health and accident insurance rate structures.

Presently, there are only a small number of companies which have already implemented safety belt use requirements for their employees. Fewer still have enforced such policies.

In companies which have incorporated a safety belt policy as part of their company-wide industrial safety effort, the company car or vehicle is regarded as one of many pieces of equipment for which standards of safe usage are applied and enforced. When a worker drives or rides on-the-job, the vehicle is his or her workplace. Thus, the use of seat belts is mandated as a requirement for safe operational procedure and (ideally) some form of enforcement program is provided for. In some companies (such as DuPont) accident and bodily injury records appear to reflect the positive results of such a policy.

1. The DuPont Company

One of the most visible and effective employer programs is conducted by DuPont, which operates a fleet of over 2,600 vehicles. DuPont has integrated its policy of mandatory use of safety belts on company business with its general focus on safety. The company believes safety means both a more secure workforce and significant cost savings. Enforcement of the belt usage policy falls to line management which is held responsible for any employees which do not comply. As a result, usage is extremely high. This is reflected by the record of only one lost workday because of an on-the-job traffic accident in all of 1980. DuPont reinforces its safety belt policy with regular safety meetings, using audio-visual aids, and with special awards to drivers. The result is high usage rates (estimated at 60-90 percent) in plants where the usage policies are reinforced and higher usage rates for employees off-the-job than among the general public.

2. Berg Electronics

The parent company also encourages its individual plants to develop and institute additional educational and/or incentive programs of their own to encourage off-the-job and on-the-job belt use by their employees. One specific example of such a program was that of the DuPont subsidiary of Berg Electronics which was described in the previous section. In this example, a belt use policy which was bolstered by an intense educational and incentive program resulted in a belt usage rate of 90 percent (9).

3. State of Iowa Department of Transportation

States are both promoters of cost-effective belt use programs and significant employers in their own right. The Iowa DOT safety belt use policy provides a model for a State-government, mandatory belt use program. With a driver

workforce of over 3,000 employees, Iowa DOT requires belt use on all job-related travel. Failure to comply is met by a sequential, progressively more severe series of penalties, including dismissal for a fourth offense. Supervisors are also disciplined for the failure of their subordinates to use belts. They also are rewarded for exceptionally good accident and injury records. As with DuPont, Iowa DOT reinforces its program with educational presentations to employees and by an atmosphere which stresses the importance of safety in one's work. A 1980 survey of Iowa employees indicated a usage rate of 54 percent in official vehicles and 31 percent in privately owned vehicles (131).

4. Northwestern Bell

Operating in five States, Northwestern Bell is a large utility company with an extensive fleet, most of which is engaged in local driving. The company has a strong on-the-job policy which stresses use of belts on all company business (even when in the employee's own vehicle). Included in the program is a training element which includes defensive driving and emphasizes the benefits of safety belt use. A film entitled "Room to Live" is also shown during this training. Managers oversee the implementation of the policy (often riding with their employees) and are held responsible for the overall safety records of their unit of operations as well as for their own belt use and accident records. Unpublished estimates of the effectiveness of this policy are high. Spot checks by company staff have reported on-the-job usage rates greater than 90 percent.

5. Dow Chemical

Dow Chemical is located in Midland County, Michigan, where it is the county's primary employer. Dow has long implemented a company policy concerning seat belt usage while on official business. In addition, Dow has engaged in considerable community public information efforts. A result of these efforts is that in 1980 Midland County had a 100 percent greater belt usage rate (approximately 19 percent) than did surrounding Michigan counties (8-10 percent). Figure 21 shows the 1980 average usage rates for counties in lower Michigan. Midland County is shown in dark outline. (Most recent observational studies have indicated a usage rate in Midland County greater than 23 percent.)

6. U.S. Air Force Bases

It should be noted that 60-90 percent usage figures have also been observed on a number of Air Force bases which have belt-use regulations and enforce them. Where such policies are not enforced, usage rates are significantly lower than where they are enforced.

Source: Michigan Office of Highway Safety Planning

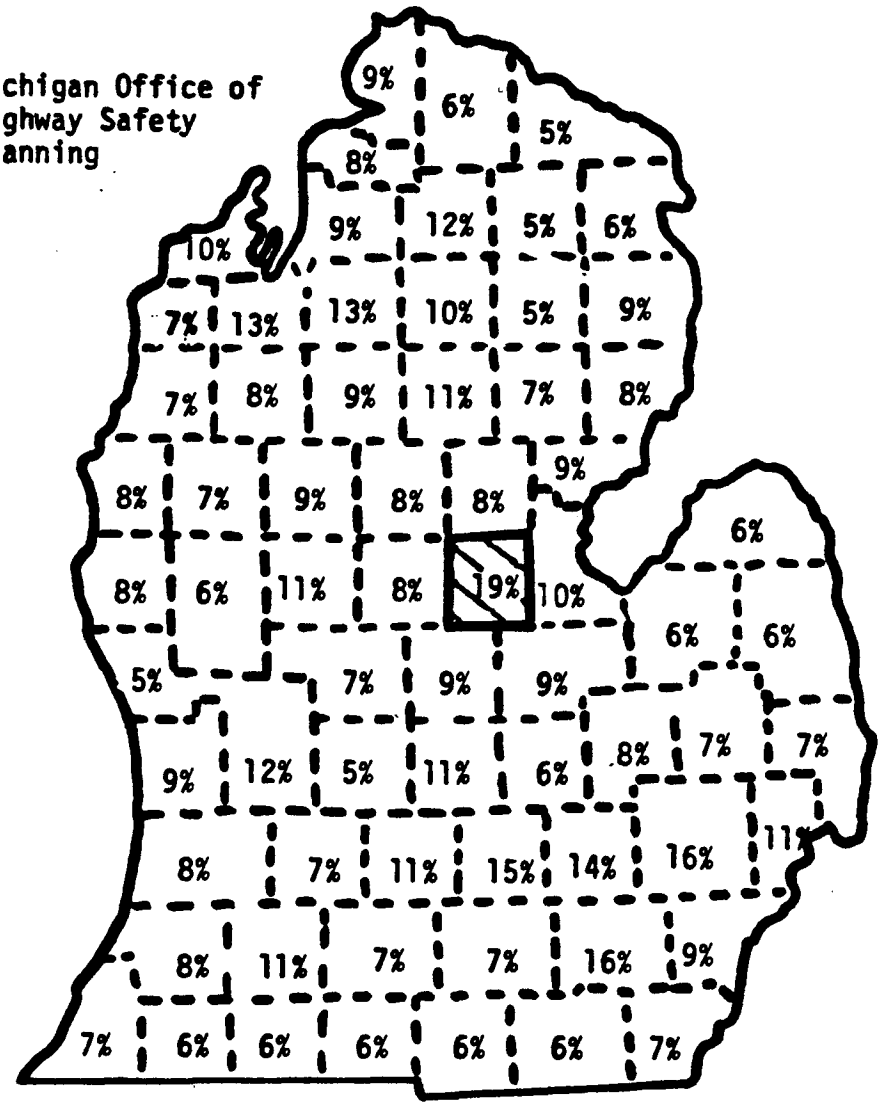


Figure 21
1980 Safety Belt Usage (%) in Lower Michigan by County

7. Safety Belt Use Policy Summary and Constraints

The costs associated with these programs can be relatively small, ranging from $2,000 to $20,000 per year. Most of the higher costs are associated with accompanying educational efforts, incentives, or rewards. These are minimal in comparison with the potential savings. The National Safety Council, for example, estimates that more workdays are lost in this country from motor vehicle accidents than from any other cause. An employer could make up the cost of a year's active belt use policy through the savings from only one accident.

The primary constraints on the implementation of company belt use policies include (a) company officials who are not convinced of the effectiveness of belts and belt use policies and (b) the availability of convincing data to persuade such officials that such activities are cost effective. Futhermore, many companies apparently do not keep records of accidents and costs associated with them at all. Among those which do, such records are often scattered among different company departments in different cities (151). More organized data collection, retrieval, and analysis systems would help companies document the savings which a safety belt policy would bring.

Plant safety consciousness is also critical. Those companies which have successful policies already have good records of safety emphasis. They hold regular safety meetings and often support positive incentives for employees as a reward for safe plant operation. Management is visibly supportive of general safety behavior and views the safety belt policy as only one of a number of company safety emphases.

Finally, cost is an issue. Belt use policies are seldom effective without comprehensive programs to back them up. Comprehensive programs can be expected to cost $2-20 thousand per year in a moderate sized company. However, if employer costs due to employee injuries from automobile crashes can be better documented and presented, these data should outweigh most of the obstacles that program costs present.

In summary, employer regulations and policies requiring safety belt use while on-the-job represent one of the more effective means by which many segments of the population can be reached and required to buckle-up (without requiring legislation). Usage rates of 60-90 percent have frequently been reported in such programs. This opportunity to initiate the development of belt usage habits is an important one and should be capitalized on.

E. Legislation Requiring Safety Belt and/or Child Restraint Usage

A decade of experience with safety belt usage laws around the world suggests that safety belt usage legislation offers considerable potential for increasing usage rates and for reducing deaths and injuries. It is also likely to be the most cost- effective highway safety countermeasure of all. As the 1976 Highway Safety Needs Study stated:

> The top ranking countermeasure, Mandatory Safety Belt Usage, has the potential to save 89,000 lives over the next ten years, at a cost of only $45 million. It thus requires the expenditure of only $506 for each fatality forestalled.

There have been a number of studies of foreign of safety belt usage laws some of the most often cited studies include:

- 1976 American Seat Belt Council (7)
- 1977 Ziegler (163)
- 1978 Robertson and Williams (114)
- 1979 NHTSA Task Force (71)
- 1980 Peat, Marwick & Mitchell (103)
- 1981 American Seat Belt Council (8)

1. Countries Having Safety Belt Usage Laws

According to the most recent survey by the American Seat Belt Council (ASBC), 29 countires or provinces now have safety belt usage laws (8). They include:

> Australia; Austria; Bulgaria; Belgium; the Canadian provinces of British Columbia, Ontario; Quebec, and Saskatchewan; Czechoslovakia; Denmark; Finland; France; Hungary; Ireland; Israel; Japan; Luxembourg; Malaysia; the Netherlands; New Zealand; Norway; Portugal; Puerto Rico; South Africa; Spain; Sweden; Switzerland; USSR; and West Germany (8).

The earliest of these laws were passed in the States of Australia from December 1970 through January of 1972, when a national safety belt usage law was passed for all of Australia. Japan also passed such legislation in December of 1971. Over the next three-year period (1972-74), four more nations and four Canadian provinces passed such laws.

By far, the greatest activity relative to the passage of such legislation came in the three-year period from 1975 through 1977 when 15 nations and four Canadian provinces passed safety belt use laws. A year later (1979) three more nations joined the ranks. In 1981, Great Britain also enacted such legislation. The legislative history from 1970 to 1980 is shown in Figure 22.

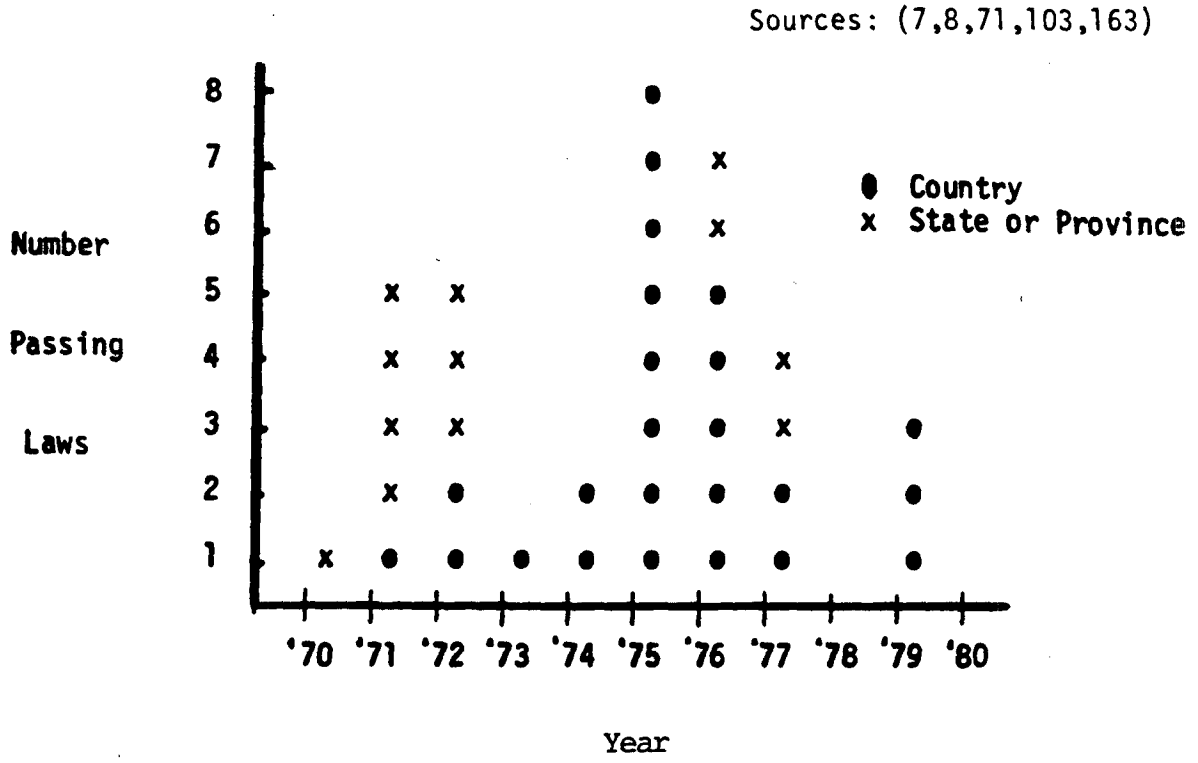


Figure 22
A History of Belt Use Legislation

2. The Effectiveness of Safety Belts Use Laws

We have had from five to ten years to observe the impact of safety belt use laws on increases in usage rates and on decreases in death and injury rates. One of the first reviews of such results of foreign legislation was by Ziegler entitled "Effect of Safety Belt Usage Laws around the World" (163). Table 17 summarizes some of the more complete data reported in this early study. Additional data from a later NHTSA study (103) are also provided to complete the information columns.

Table 17
An Early Summary of Effectiveness Data Concerning Safety Belt Usage Laws Around the World*

	Australia (All States)	France	Belguim	Canada (Ontario)
Date of Law	Jan. 1972	July 1973	June 1975	Jan. 1976
Penalty	$20 (max)	$20 (max)	$15 (max)	$100 (max)
Enforcement	yes	yes	(yes)**	yes
PI Program	yes	yes	(yes)**	yes
Usage (before)	25%	26%	(17%)**	17%
Usage (after)	68-85%	64-85%	92%	64-77%
Injury reduction	20%	32%	24%	15%
Fatality reduction	25%	22%	39%	17%

* Summary of all cases where effectiveness data was provided.
** Data taken from later study (103).

Source: Ziegler (163).

Overall, while claims of reductions of death and injury were as high as 39 percent, the average reported reduction was in the 15-30 percent range and resulted from an increase in usage rates in the 40-60 percent range. It was pointed out by this author that nations which enforced their law and provided penalties for non-compliance had higher usage rate increases (and thus greater decreases in deaths and injuries) than those which did not.

The next review was conducted during 1976 and reported by the American Seat Belt Council (ASBC) in August of that year. This report, entitled Seat Belt Use Laws Abroad (7), reaffirmed the position that where laws were enforced and where a penalty provision was included in the law, usage rates were significantly higher than in nations where this was not the case. This review concluded that safety belt usage increased by two to four times in all of the countries surveyed (including three which had no penalty provision).

During 1977, the NHTSA undertook a second review of the effectiveness of foreign belt use laws. The report issued in 1977 and updated in 1978 was entitled Task Force Report on Safety Belt Usage Laws (71).

One of the first aspects of belt use analyzed by the NHTSA report was the change in usage rates which resulted from the passage of foreign belt use laws. Prior to such laws, usage rates in most of these nations (or provinces) was generally in the 20-40 percent range. Where such laws were enforced,

usage rates usually increased 2 to 3 times or 50-60 percentage points (i.e., an increase in usage from 20 percent to 70 percent usage is both a 250 percent increase and a 50 percentage point increase). Figure 23 illustrates the pre and post legislation usage rates of several of the nations reviewed in this report.

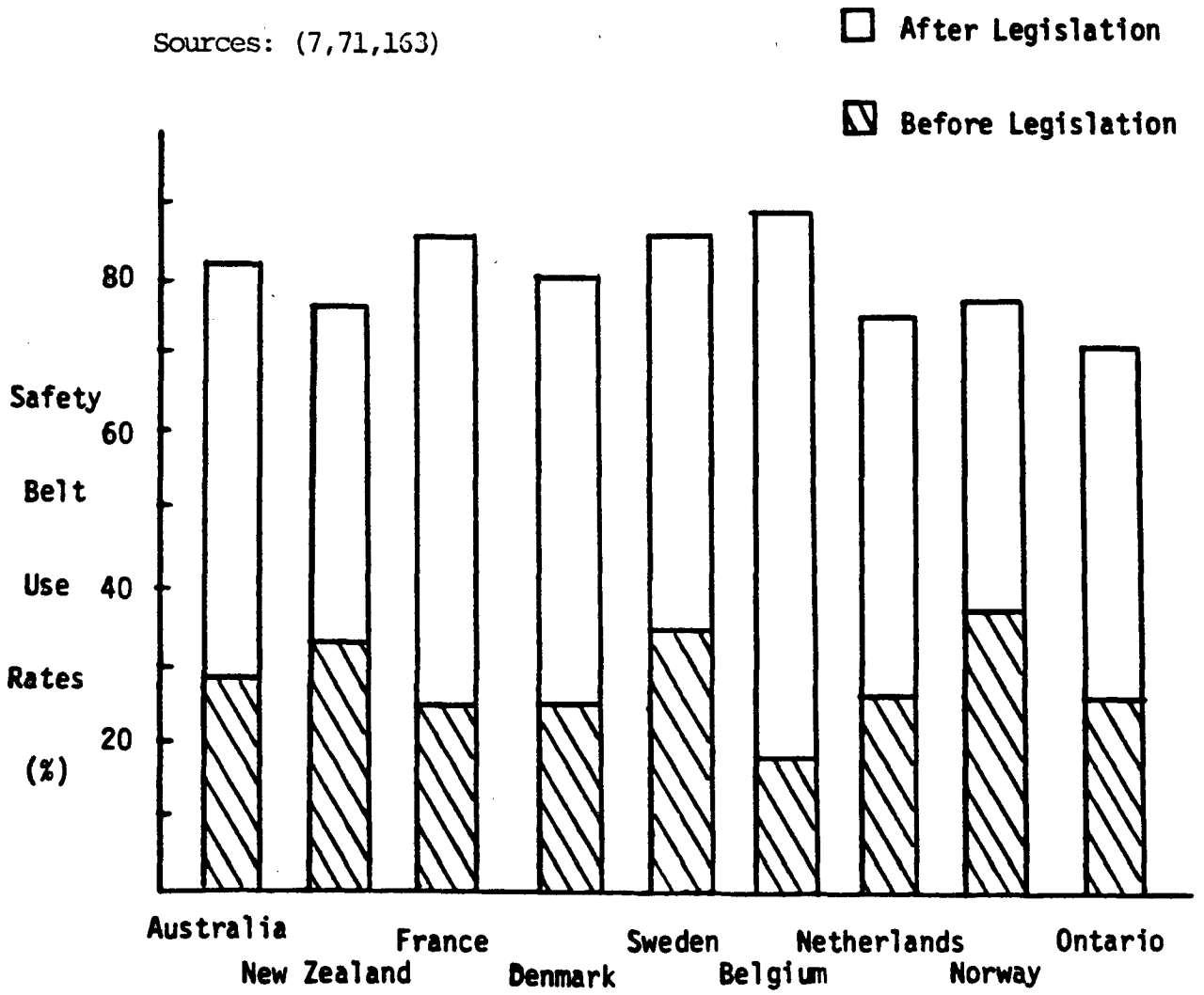


Figure 23
Safety Belt Usage Rates in Selected Nations Before and After Belt Use Legislation was Passed

On the issue of usage rates, the NHTSA Task Force Report also concluded that:

> ...most usage laws, if accompanied by a reasonably effective mass media campaign and an effective enforcement program, will result in an increase of at least 50 percentage points to a total of 70-80 percent usage.

3. Actual Versus Expected Effectiveness of Safety Belt Usage Laws

Another aspect studied by the Task Force Report was the extent to which expected reductions in injuries and fatalities (based on observed increases in belt usage) were realized. In summary of this examination it was observed that in some cases the actual reductions in fatalities and/or injuries were not as great as was predicted on the basis of usage rate increases alone.

A number of researchers (24, 71, 114) have suggested that differences between estimated and observed reductions may be due to the fact that higher risk drivers (e.g., drinking, drivers, multiple offenders, etc.) are the least likely to buckle-up and thus are last to be included among the ranks of belt wearers as usage rates increase. A second reason may be that the statistics provided often do not take into account the fact that the numbers of vehicles, drivers and crashes continue to increase each year. Also, usage rates usually refer only to front seat occupants. Finally, it must be considered that the driving environment is different in other countries. Factors such as more rural driving, higher speeds on rural roads and fewer emergency medical services can be expected to reduce estimates of the effectiveness of belts.

4. Summary of Findings of Reviews of Belt Use Law Effectiveness

Over the past five years, a number of reviews of the effectiveness of foreign safety belt usage laws have been conducted (7, 8, 71, 103, 114). While some have reported slightly different usage rate and fatality reduction effects for various nations, the results and conclusions have been reasonably consistent.

Figures 24 and 25 summarize the findings of these reviews in terms of usage rate increases and in terms of fatality and injury decreases, respectively. In general, the findings of these reviews have been that in nations which have passed and enforced a law requiring safety belt usage (usually for front seat occupants), the following have been observed:

- Pre-law usage rates of 20-40 percent
- Post-law usage rates of 70-90 percent
- Increases in belt usage of 40-60 percent
- Reductions in occupant deaths injuries of 15-30 percent

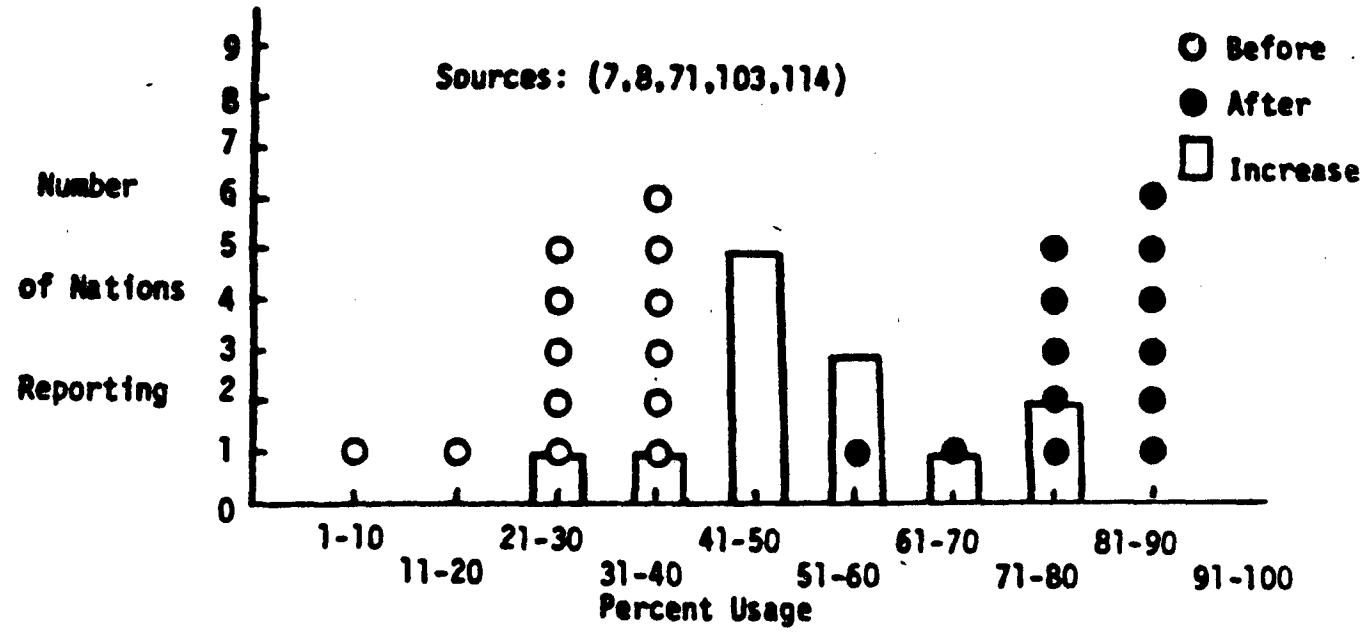


Figure 24
A Summary of Pre and Post Law Usage Rates and Usage Rate Increases for 14 Nations Passing Safety Belt Usage Laws

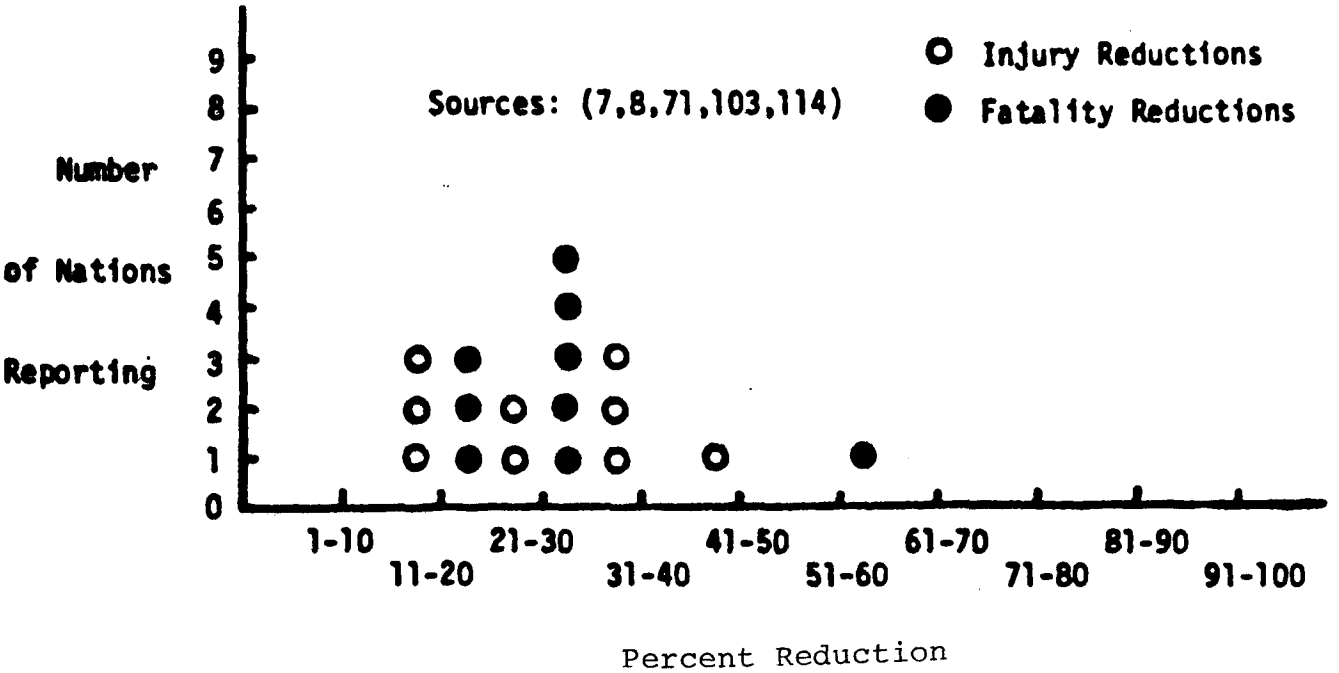


Figure 25
A Summary of Reported Decreases in Fatalities and Injuries for Nine Nations Passing Safety Belt Usage Laws

5. The Importance of Enforcement on Legislation Effectiveness: Canada and West Germany

The Canadian experience with regard to safety belt legislation deserves special mention, not only because Canada is the closest neighbor of the United States with safety belt usage legislation but also because of some unique problems in the Canadian implementation of usage laws. First, legislation was not enacted in all Canadian provinces. Only four provinces passed laws requiring the use of safety belts. Ontario was the first, passing legislation in January of 1976. It was followed by Quebec in August of 1976, and by Saskatchewan and British Columbia in 1977.

A recent report on the Canadian experience (129) indicated that the initial impact of the law on usage rates was substantial. For example, roadside surveys in Saskatchewan showed an increase in usage from approximately 26 percent to 80 percent, (an increase of over 200 percent or 54 percentage points).

Similarly, usage in Ontario increased from 17 percent, before the law, to 77 percent, one month after the law (an increase of over 350 percent or 60 percentage points). No similar increases occurred in jurisdictions where no such legislation was enacted.

The initial increases in Ontario were in large part due to intensive enforcement which was apparently not sustained after passage of the law. As a result, usage declined steadily to a low of 48 percent, 17 months after legislation. Usage rates in Saskatchewan also declined after legislation from a high of 90 percent to approximately 65 percent, one year later. The Canadian report(129) concluded that sustained enforcement was essential to maintain usage rates at the substantial levels obtained immediately following legislation.

Most studies also suggested, however, that enforcement of belt use laws is not particularly difficult and that initial losses due to a lack of enforcement can be regained over time. In the case of the Federal Republic of Germany, for example, usage rates have been maintained at moderately high levels despite a drop in usage following the levels reached immediately following legislation (103). Figure 26 illustrates the dip in usage rates following an initial post-legislation increase and the subsequent recovery of high usage rates over time.

Sources: Seidenstecker (123)
Peat et al. (103)

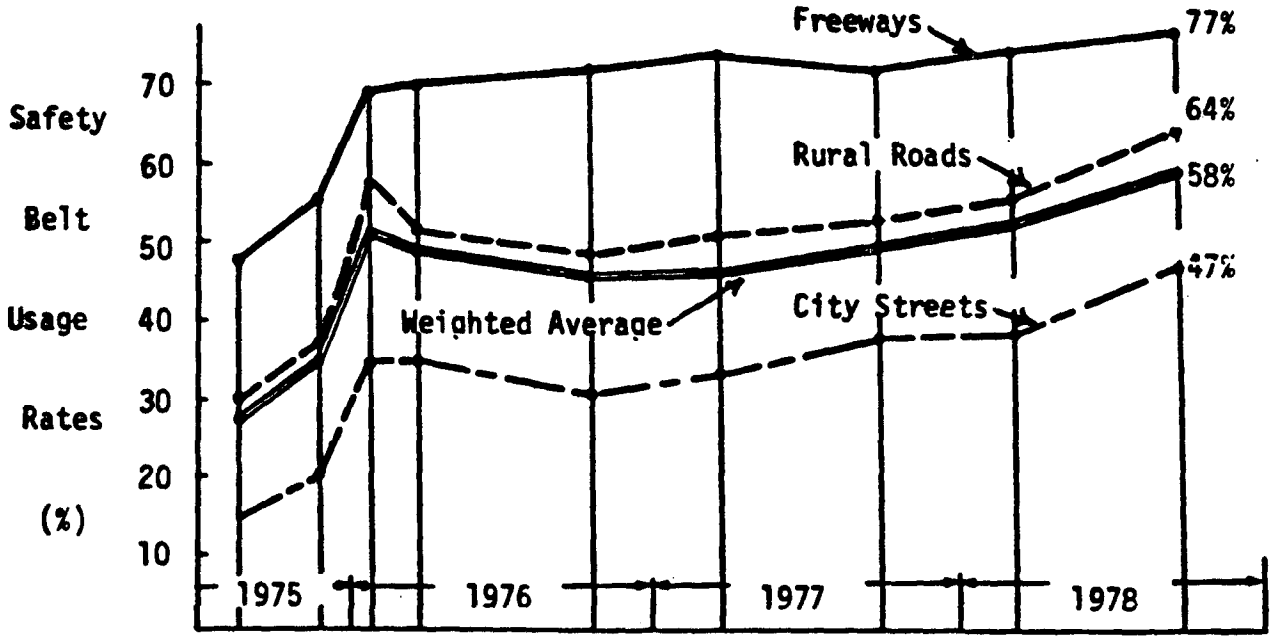


Figure 26
Safety Belt Usage Rates in the Federal Republic of Germany

The 1980 NHTSA review entitled Effectiveness of Safety Belt Usage Laws (103) concluded the following relative to enforcement and the success of foreign belt use laws:

- In almost all countries it was found that the seat belt law was not enforced independently of other traffic infractions. It is almost always enforced only as an ancillary action in connection with some other traffic violation.

- Enforcement of seat belt laws appears to be essential to a high seat belt usage rate. In several countries it was determined that the usage rates were usually associated with stringent enforcement. However, in some cases it did appear that the people's cultural propensities for being highly law abiding obviated the need for stringent enforcement.

- Studies in virtually all countries revealed that the seat belt usage rates rise 200 to 300 percent immediately after the seat belt law becomes effective. The rate subsequently drops as much as 10 to 20 percentage points and then rises to some plateau, depending on the amount of attention and enforcement provided by government officials.

Clearly, these findings paralled the findings of all the previous reviews cited (e.g., Ziegler (163), American Seat Belt Council (7, 8), and NHTSA (71)).

6. An Example of Reductions in Fatalities and Injuries as a Result of Safety Belt Usage Legislation: Victoria, Australia:

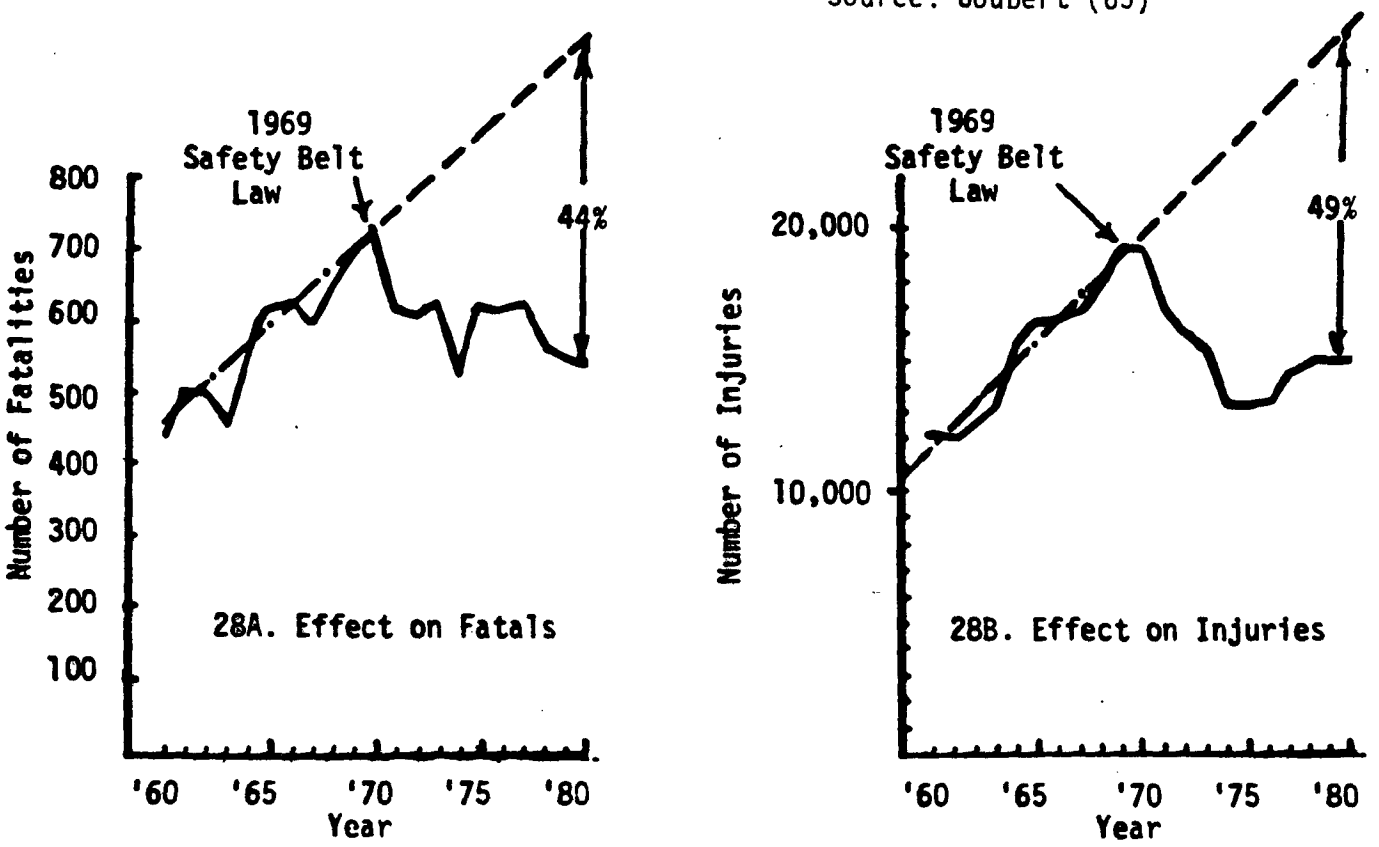
The Australian experience is perhaps the most often cited success story for belt usage legislation. For that reason, it would be useful to review some of the most recently reported data from that country, especially from the State of Victoria (65, 103).The State of Victoria introduced the seat belt usage law one year before any other State in Australia. In the cities, the usage rate rose to 75 percent (in those cars which were fitted with belts) and to 64 percent in the country. This compares with a usage rate of about 18 percent before legislation (65). The usage rates increased over the succeeding years and are presently greater than 90 percent in metropolitan areas and greater than 80 percent in rural areas.

During the first year, 1971, fatalities to drivers and to passengers of cars in Victoria dropped from the 1970 level by 15 percent and 19 percent, respectively. In the remainder of Australia the change was 2 percent and 0 percent respectively. During the same year, injuries to drivers and passengers in Victoria dropped by 14 percent and 10 percent, respectively. The change in the reminder of Australia was an increase of 2 percent and 0 percent, respectively. There was little doubt that these significant reductions were due to the belt use law (65).

This reduction in death and injuries to drivers and passengers of cars has continued. Figure 27a shows the actual number of vehicle occupants who were killed annually. The dotted line represents the expected increase in deaths based on predictors of number of vehicles, fuel consumption and population. The percent reduction from the expected trend in vehicle occupant deaths is shown by the figure. The number of vehicle occupants injured also dropped remarkably below the expected trend as shown in Figure 27b (65).

As can be seen from these figures, when projected increases in crashes due to increases in the number of drivers (and driving) are taken into account, overall reductions in deaths and injuries from baseline data are even greater than when such projected increases are not taken into account.

Source: Joubert (65)



Figures 27a and 27b
Reductions in Fatalities and Injuries in Victoria, Australia as a Result of Mandatory Safety Belt Usage Legislation

7. Examples of Reductions in Specific Injuries and/or Costs.

Relative to reductions in specific types of injuries and costs, following are statements made by officials of various nations in response to the 1981 American Seat Belt Council Survey entitled International Seat Belt and Child Restraint Use Laws (8):

a. Canada

In 1976, the first year of the law's operation, the Ontario Government compared health care costs from highway accidents with the previous year and discovered the following:

- The cost of active treatment care for hospitalization victims declined by 10.7 percent, a savings of nearly $2 million.
- The number of hospitalized victims decreased by 13.7 percent.
- The number of in-patient victims declined by 21.6 percent.
- The number of victims requiring out-patient care dropped by 14.7 percent.
- Minor injuries were reduced by 13 percent, moderate to severe injuries by 14.5 percent.
- The average treatment cost for accident victims wearing seat belts was $228, for unbelted victims $419.

b. The Netherlands

A very important conclusion is the pronounced absence of skull and brain injuries among seat belt users... The fact that these injuries occur less among seat belt users explains to a large degree the great, already mentioned, effectiveness of all three types of seat belts (8).

c. Sweden

The effects of seat belt use also have shown up in reduced medical costs. A recent study by the University of Stockholm found the belt law saves Sweden between $22 and $45 million annually in reduced medical and other societal costs. It also reported Sweden receives a return of three to four krona for every one invested in public information campaigns and enforcement programs related to seat belt use.

Seat belts are effective in reducing medical costs because they cut by at least one-half the severity of injuries to the skull, face, throat, chest, and pelvis. They prevent many more injuries to the abdomen, arms, and legs. One group of Swedish researchers, after reviewing the evidence, concluded, "Traffic accident injuries to seat belts users are always less severe than if no belt has been used." (8)

Child Restraint Legislation

1. Foreign Experience

The 1981 survey by the American Seat Belt Council (8) indicated that child restraint legislation has lagged behind safety belt usage legislation in most foreign nations. In such countries the only mention of children in belt use laws is usually in the form of exempting them from the requirements of the laws. Many foreign countries, however, require that children ride in the rear seat.

Only in Australia and in the Canadian Province of Saskatchewan is legislation currently in effect which requires the use of child restraints. In Saskatchewan, the legislation is too recent (June 1980) to have been evaluated.

In Victoria, Australia, however, child restraint legislation has been in effect since 1976. It requires that children under age 8 be restrained by a proper child seat restraint or be in the rear seat. As a result of the legislation, the average usage rate of children (in the front seat) increased from 25 percent to approximately 70 percent (an increase of 180 percent or 45 percentage points). The legislation also increased the proportion of children riding in the less dangerous rear seating position from 79 percent to 85 percent. However the majority of those in the rear seat (67 percent) remained unrestrained (148).

Within 2 years, 90 percent of the children were observed to be riding in the rear seat and only 10 percent were in the front seat. Still, only 33 percent of those riding in the rear were restrained, while 67 percent of those in the front seat were restrained. Figure 28 shows the results of the law on seating position and usage rates.

Source: Vulcan (148)

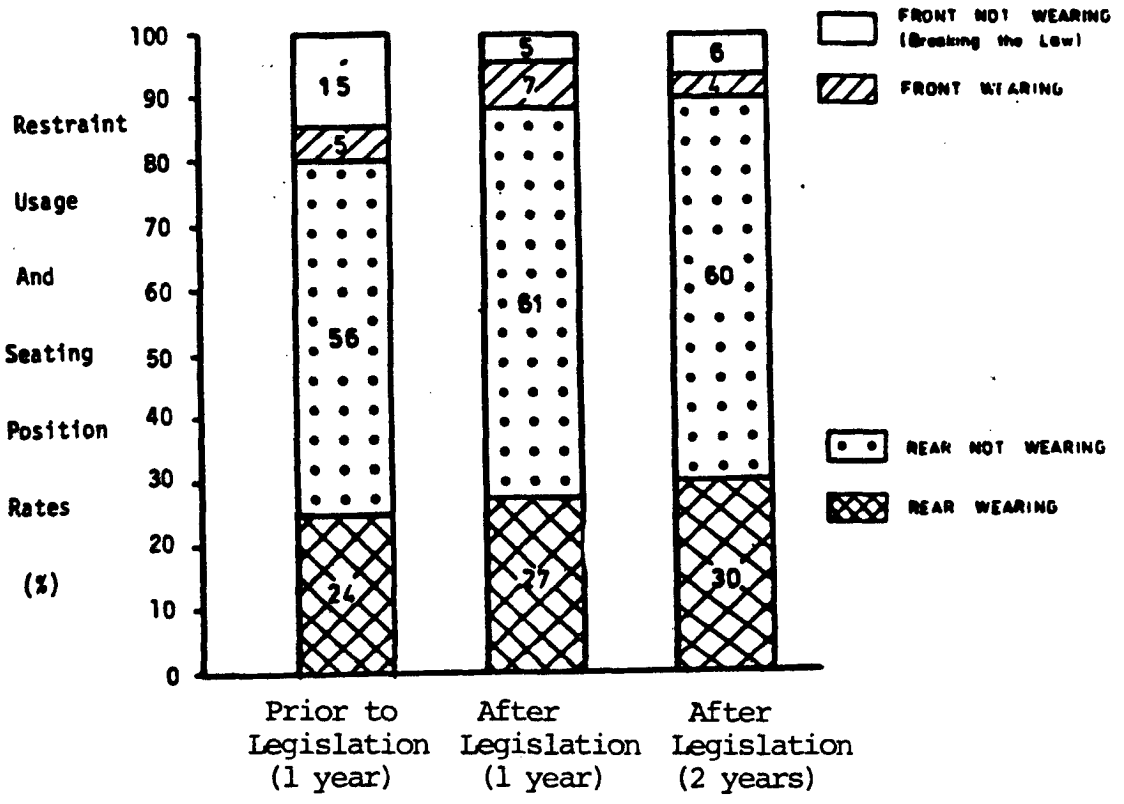


Figure 28
Seating Position and Restraint Usage Rates for Children Under Age 8 in Victoria, Australia

During the first full year following the legislation and the changes in seating position and usage rates described, child passenger casualties dropped by 11 percent in Victoria. However, since the total number of child passenger casualties had been decreasing somewhat since 1971, it is not exactly clear how much of the decrease was due to the law.

The overall increase in child restraint usage in Victoria was modest, from 34 percent to 41 percent (a 20 percent or 7 percentage point increase). While this is not dramatic, the combination of (1) more children riding in the less dangerous rear seat (70 percent before the law versus 90 percent after the law) and (2) proportionately more of those children who are riding in the more dangerous front seat being restrained (25 percent before the law versus 67 percent after the law) should not be underestimated.

The importance of riding in the rear seat has been shown by studies in the United States. Figure 29 shows the effect of both seating position and restraint usage for children under age 15 in terms of injuries (159).

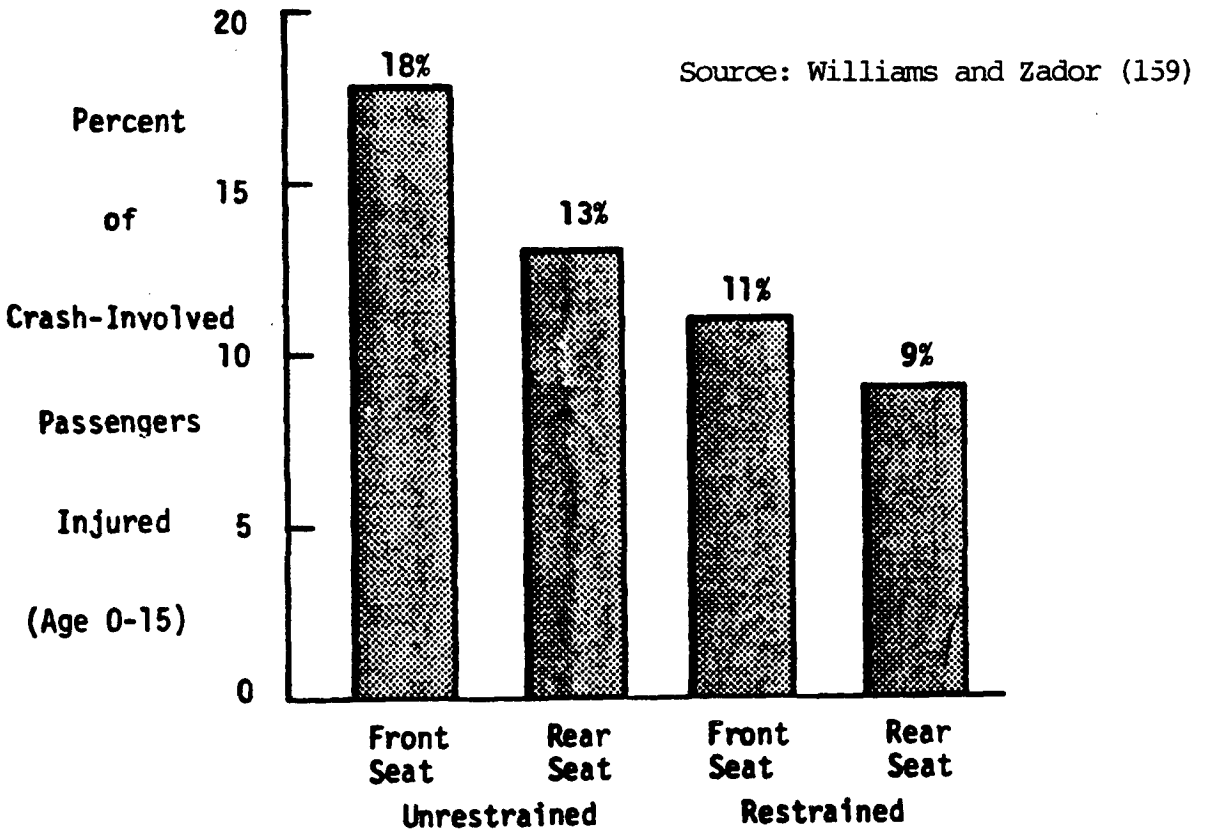


Figure 29
Automobile Crash Injury Rates for Children Under Age 15 by Seating Position and Restraint Use.

2. U.S. Experience

In the United States, there has recently been considerable activity in the area of child restraint legislation. The first State to pass such a child restraint use law was the State of Tennessee in 1978. Since that time, 10 additional States have passed some form of child restraint legislation. A number of additional States are also considering such action.

A 1981 National Safety Council report (92) summarized the recent child restraint legislative activity as follows:

> Over 100 pieces of legislation relating to Child Passenger Protection were introduced in 41 States in this year (1981), in what was clearly, a successful drive to stem the injury and death rate of children less than 5 years old from automobile crashes. New York, Michigan, North Carolina, and Maine are the most recent additions to the list, having passed legislation in mid-summer. These efforts came on the heels of earlier successes in West Virginia, Minnesota, and Kansas as well as amendments strengthening existing laws in Rhode Island and Tennessee. Adding Virginia's resolution to disseminate educational materials and California's education bill, passed in late 1980, brings the number of States who have taken positive action up to 11--and the story is not yet finished for this year. Several States California, Massachusetts, New Jersey, Ohio, Pennsylvania, and Wisconsin still have bills pending before the legislatures; some with excellent chances of passage before the year is out.

States which have passed child restraint legislation are: (1) Tennessee; (2) Rhode Island; (3) California; (4) Maine; (5) West Virginia; (6) Minnesota; (7) Kansas; (8) Michigan; (9) New York; (10) North Carolina; and (11) Virginia (joint resolution).

Most of such laws have not been in effect long enough to be evaluated. However, the Tennessee law has received considerable evaluation effort (105). The results of such evaluation (see table 12) indicate that the Tennessee law (along with the public information program which accompanied it) has increased overall child restraint usage in the State from 9.2 percent in 1977 to 18.7 percent in 1979 (an increase of 103 percent or 9.5 percentage points). In urban areas, usage of child restraints increased from 11.8 percent in 1977 to 22.9 percent in 1979 (an increase of 94 percent or 11.1 percentage points).

While these initial increases were not dramatic, usage rates have continued to increase in the State. The most recent surveys conducted in Knoxville and Nashville have reported usage rates of nearly 30 percent. This represents an increase of more than 200 percent or 20 percentage points from 1977 usage rates. Enforcement of the law appears to be a major factor contributing to the increased usage since 1979 (113).

At this point, the impact on deaths and injuries is not clear. On the one hand, all of the child passenger deaths investigated over the two-year period following implementation of the law involved unrestrained children. Additional comparisons of major injuries received by unrestrained versus restrained children (see table 5) have indicated that the use of child restraint devices reduced death and injury by 50-70 percent, when they were worn (105). On the other hand, due to the fact that only about 9 percent more children were restrained in 1979 than in 1977, an impact was not reflected in terms of an observed reduction in overall child passenger injuries and deaths in the State. Such an impact should be observable (in terms of reductions in injuries) when usage rates in the 40-50 percent range are obtained.

In the meantime, Tennessee should be regarded as a pioneer State in the promotion of child restraint laws. While young child passengers account for only about 2.5 percent of all passenger car fatalities, more than 700 are killed and many thousands more are injured each year in traffic crashes. This makes automobile crashes the leading killer of young children. The ever-increasing use of child restraints can reduce this total and in the process of doing so, it can reopen the possibility of protecting the much larger number of adult passengers by means of safety belts.

Safety Belts and Child Restraint Legislation Summary and Constraints

1. Summary

Legislation is this area is a matter of State choice and responsibility. While the potential for safety belt and child restraint usage laws to reduce death and injury is clear, successful legislative efforts are not likely to occur without other supporting measures such as public information, education and incentive programs. Legislation in foreign countries has resulted in usage rates as high as 70-90 percent and reductions in death and injury ranging from 15 30 percent.

2. Constraints

The obvious constraints involved with safety belt (and child restraint) legislation efforts are the difficulties involved in (1) educating the public, and (2) developing positive attitudes towards the need for restraint use.

a. Background

In the United States, considerable legislative activity was stimulated in 1974, when the Congress provided an incentive program to the States to pass safety belt usage laws. More than half of the States introduced such bills into their legislatures in the year that followed. Following the discontinuance of this program, the States reduced their safety belt legislative efforts. The repeal of the interlock rule in 1974 and the repeal of several State motorcycle helmet laws from 1976 to 1978 also greatly increased the resistance to mandatory approaches among State legislators.

b. Attitudes

The foreign experience has been somewhat more positive. The 1980 NHTSA study entitled Effectiveness of Safety Belt Usage Laws, (103) indicated that in most of the nations which have passed safety belt legislation, the majority of the public approved of such laws. In some cases such attitudes had been brought about by several years of public information efforts.

One notable exception was in the case of Ontario, Canada. When the belt use legislation was passed in January of 1976, telephone survey data suggested that only about 48 percent of the populace were in favor of such a law. However, public information efforts following passage of the law resulted in a majority favoring the law. These surveys indicated that 60 percent of the public favored the law by October of 1976 and 72 percent favored the law by May of 1977 (73).

In the United States, the situation relative to attitudes towards safety belt laws is similar to that in Ontario. While there appear to be no strongly polarized factions against such laws, most of a number of national polls conducted since 1976 have indicated that the majority of the populace has not favored such laws.

Table 18 shows the results of such surveys. These data suggest that a voluntary public information, education, and incentive program would be the most desirable approach to pursue in this country at the present time.

Table 18
Results of National Surveys of Attitudes Toward Safety Belt Use Laws

Year	Pollster	% in Favor of Laws	% Against Laws
1976	Yankelovich, Skelley and White (162)	29%	66%
1976	Insurance Institute for Highway Safety (115)	47%	50%
1977	American Automobile Assn. (5)	41%	47%
1977	Gallop (41)	17%	76%
1978	Peter Hart and Associates (51)	39%	57%
1978	Tecknekron (136, 137)	54%	45%

In 1977, the University of Michigan's Highway Safety Research Institute prepared a review of the literature for the NHTSA concerning attitudes towards safety belt usage laws (48). This review indicated that the usual negative reasons for not approving of safety belts come up time and time again. These include:

- o the disbelief that belts actually protect you in a crash;
- o the discomfort and inconvenience of safety belts; and
- o the idea that belts can trap you in a crash.

The report also pointed out that Canadian and Australian studies generally show approval of such laws with approval increasing after their enactment. This review suggested that public information campaigns are needed to change the public's attitude towards safety belt usage legislation.

Nearly all reviewers of safety belt usage laws have pointed out the importance of substantial public information and education programs prior to the pursuit of such legislation. Most such reviews have also pointed out the need for significant elements of society such as physicians, auto clubs, and the media in order to gain passage of such legislation.

c. Child Restraint Laws

As Tennessee and other States have discovered, there are many obstacles to the passage of child restraint legislation as well. Some opponents of such legislation feel that it is an unwarranted intrusion into the family. This feeling was, in large part, responsible for Tennessee's "baby crusher" clause which allowed for a child to be carried in the arms of an adult. This clause has since been removed from the Tennessee Law.

As in the safety belt area, to gain passage of a State child restraint law, the cooperation of many proponents is needed. Both pediatricians and the police have been found to be effective spokespersons, as are hospitals, PTA's, Jayceettes, Red Cross workers, etc. Loaner, rental, and discount sales programs can, to a large part, overcome cost arguments. Still, however, if the Tennessee experience is typical, usage rates will not automatically increase to 80-90 percent levels. Public information, education, and enforcement will be required to raise usage rates to levels which can result in documented reductions in death and injury.

V. Approaches Suggested by Past Studies for Conducting Voluntary Usage Programs

Suggested approaches for increasing voluntary safety belt and child restraint usage have come from a number of sources. While the foreign safety belt experience has suggested that legislation is likely to be an efficient and effective method for increasing usage rates, even this experience suggests the need to begin the process with comprehensive public information and education programs. Some recent studies which provide suggestions for future voluntary use progams include:

- o 1977 Market Opinion Research (78)
- o 1979 National Academy of Sciences (140)
- o 1980 National Academy of Sciences (141)
- o 1981 Tarrance and Associates (134)

In addition to the above studies, suggestions were provided by the series of safety belt and child restraint workshops conducted by NHTSA in 1979, 1980 and 1981.

A. The Need to Target Different Groups

Both the 1977 Market Opinion Research (MOR) Study and the 1981 Tarrance and Associates Study suggested that primary emphasis must be placed on the substantial percentage of drivers who are low to moderate users and who thus already have a partially developed safety belt use habit. However, both studies emphasize the need to target many different segments of the population. The MOR study, for example, also emphasizes the need to address adolescent drivers. Both studies suggest a strong appeal aimed primarily at the responsibility and authority of drivers to get their passengers to buckle-up. (Many foreign nations hold their drivers responsible for their passengers' safety.)

B. The Need for Organizational Networking

Nearly all prior studies (and the NHTSA workshop series) have suggested the need to work more closely with other networks and organizations at the Federal, State, and local levels. Both National Academy of Sciences studies emphasized this point. The 1979 study which reviewed NHTSA's 1980 program plans in this area (140) put it this way:

> "... one factor will ultimately determine whether the use of restraints increase significantly and permanently: that is, the degree to which all levels of government, business, health-care professionals and institutions, and community organizations devote their energies and resources to positively influencing people's behavior. States, then should concentrate on motivating these groups and on helping them obtain appropriate information and education materials. States also should coordinate and evaluate the overall effort to encourage restraint use."

The report also stated:

> "Part of NHTSA's (1980) Occupant Restraint Plan reflects its traditional tendency to communicate with individual drivers. The workshop suggested that the emphasis should be on changing the practices and policies of existing institutions so that they do an effective job of encouraging individuals to use their seat belts. These institutions need to perceive that the non-use of seat belts is a problem they can help solve."

C. Summary of the 1979 National Academy of Sciences (TRB) Report Recommendations

In addition to emphasizing the need for working with a multitude of organizations and institutions, the 1979 National Academy of Sciences Study made the following recommendations:

(1) Place emphasis on child restraint programs.

There usually is a positive response in this country for activities and ongoing programs that will protect children. Most parents have never been informed about the dangers children are exposed to in motor vehicles or about how best to protect them; these parents would welcome such information. In this area there is no "wall of negativism" to overcome as is the case with adult use of safety belts. Emphasizing child restraint programs could lead to dramatic progress in involving large segments of society in occupant protection activities, and this may lead to broader support for protecting all vehicle occupants.

(2) Develop Economic Loss Data.

A possible major reason that governments and businesses have never made a significant effort to increase restraint usage is that there are no data systems to describe accurately the economic losses these institutions (and their taxpayers or stock holders) suffer as a result of the nonuse of restraints both on and off the job.

(3) Conduct Workshops for Target Groups.

Workshops on the importance of seat belt use could be offered as part of national or regional conferences of professional, business and governmental associations and in specially scheduled regional meetings in cooperation with NHTSA regional offices. Another possibility would be to provide Governors' highway safety offices with the assistance they need to stage their own workshops.

(4) Counter Negative Impact of Media Programming.

Television and motion pictures rarely show situations in which adults use restraints properly and young children do not appear in proper restraint devices. Further, unrestrained actors are shown surviving wild rides and crashes without a scratch. (NHTSA needs to find ways to counter such programming practices.)

The following messages were suggested by workshop members as potential ways to use the television and radio media:

- o To parents, asking if they know how their children are being transported by the schools, describing the dangers, urging their local involvement to achieve restraint policies and educational programs to teach kids safe riding habits.

- o To doctors, asking what they are doing about the number one health problem for children and adults, suggesting things they can do, where they can get information.

- o To taxpayers, asking if they know how much of their social security deduction and State Welfare budget goes for crash victims who did not wear restraints and for the families of those people, urging them to urge their friends to buckle up and save money.

- o To taxpayers, asking if they know how many State employees are injured while riding unrestrained on State business and how much money is lost as a result, suggesting they support educational programs and (belt) use requirement policies.

- o To business managers and owners, asking if they know what portion of their operating expenses goes for employees injured or killed, on or off the job, because restraints weren't used, suggesting the need for effective data systems, education programs, belt use policies, describing where to get help.

- o To all adults, telling of the danger of transporting young children unrestrained, suggesting legal actions to help protect all children.

D. Summary of the 1980 National Academy of Sciences Report Recommendations

The 1980 National Academy of Sciences Study (141), which was mandated by the Congress in 1979, made the following recommendations to the States and to the Federal Government:

(1) Enact Child Restraint Laws.

The States should enact child and youth occupant restraint laws: The Federal Government should offer technical assistance and incentives ...

(2) Issue Belt Use Requirement Policies.

The Federal Government, in its own activities should provide an example of compulsory safety belt use. Federal agencies should require and enforce on-the-job safety belt use ...

(3) Develop More Effective State 402 Programs.

States should make more productive use of the Federal assistance funds set aside for safety belt programs. The Federal Government should provide more detailed guidance ...

(4) Identify Economic Costs of Belt Non-use.

The economic costs of not using safety belts should be identified and publicized among the groups that mainly bear those costs. The Federal Government should conduct studies ... (and) ... educate the public ...

(5) Comprehensive Employer Belt Usage Policies.

Employers should require on-the-job safety belt usage by their employees. The Federal Government should develop and test model safety belt use programs.

(6) Identify Crash Deaths and Injuries as a Major Public Health Problem.

Traffic crash injury and death should be recognized as a major public health problem ... the Federal Government should involve its health agencies, as well as its traffic agencies, in safety belt programs.

In addition to the above points, the later NAS Study (141) emphasizes the need to explore, develop, and implement incentives for safety belt usage both from an organizational (economic) standpoint and from an individual (reward) standpoint. The report stated that incentives should be considered as an inherent part of any employee safety program and that incentives should be provided to the States to conduct safety belt programs. Finally, primary organizations or networks within the State which were suggested for emphasis included: (1) schools; (2) health care systems; and (3) the media.

E. Summary of 1977 MOR Study Findings Relative to Approach

Another voluntary use approach aimed primarily at different seat belt user types was suggested by the 1977 MOR Study (78). This study suggested aiming different media messages to different groups of belt users (or non-users) such as:

(1) Total drivers
(2) Confirmed belt users
(3) Moderate belt users*
(4) Non-users and
(5) Adolescents

Table 19 summarizes the various attitudinal approaches which appeared to relate most to usage rates within these groups.

Table 19
Attitudinal Factors Related to Belt Use
Among Various Belt User Types

Importance	Total Drivers	Confirmed Users	Moderate Users	Infrequent Users	Adolescents
First	Seat Belt Affect	Fear of Entrapment	Seat Belt Affect	Seat Belt Affect	Seat Belt Affect
Second	Fear of Entrapment	Worry About Accidents	Fear of Entrapment	Worry About Accidents	Fear of Entrapment
Third	Fear of Major Accidents	Careful Driving Habits	Careful Driving Habits	Fear of Entrapment	Careful Driving Habits

The MOR study concluded that actual safety belt use is a direct function of: (1) an individual's general affective attitude; (2) driver interactions with other adults and teenage passengers, and (3) the propensity to use seat belts. This suggests three important approaches for programs to increase seat belt use:

(1) Develop a framework which is based on information which demonstrates the necessity of safety belts in defining what makes a good driver.

The factual evidence that safety belts reduce accidents is important, but demonstrating to the moderate and non-user that the image of a safety belt user is that of a secure driver with good judgement seems to be the key image the confirmed user has.

(2) Encourage the driver, through his or her authority position, to be responsible for the safety belt use of others in the car.

It is necessary to demonstrate this authority and responsibility position in any messages (mass media or otherwise) about safety belt use. Simply stating, "You are responsible for others" would lack the necessary context of the actual driving experience. Placing the authority/responsibility in actual driving situations is critical for demonstrating to moderate and non-users the content and importance of such interactions in terms of overall driving behavior.

(3) **Make fastening the safety belt an integral part of the trip start-up procedures**

Structural factors like the interlock system impose such (perceived) severe restraints on drivers that defeating such systems becomes the norm (although belt use clearly increases). However, constant reinforcement of the idea that putting on safety belts (like turning on an ignition) is part of normal driving procedures will increase belt use.

Some additional findings of the study which should be capitalized on when planning a voluntary belt usage program include the following conditions under which various users types were found to use belts most often:

(1) **Non-users** were sometimes found to wear belts when they:

- o are in sports cars
- o perceive belts are comfortable
- o have a positive affect (attitude)
- o do not feel trapped
- o perceive that the weather is bad
- o buy a new car
- o have had formal driver education
- o fasten their belts as one of the first steps

(2) **Moderate users** were found to use belts more frequently when they:

- o drive subcompacts
- o feel belts are not inconvenient
- o have positive affect (attitude)
- o do not fear entrapment
- o interact as drivers to passengers
- o perceive that the weather is bad
- o buy a new car
- o fasten their belts as one of the first steps

(3) **Confirmed users** were found to use belts most frequently when they:

- o drive sports cars
- o interact with children about belts
- o have had formal driver education

(4.) **The total population of drivers** was found to use belts more often when they:

- o drive small cars
- o feel belts are necessary
- o do not fear entrapment
- o interact with children
- o buy a new car
- o have had formal driver education
- o buckle up as a first step

F. Summary of the 1981 Tarrance and Associates Report Recommendations

Finally, the most recent study conducted for NHTSA to suggest potential approaches for voluntary safety belt use programs (134) made the following recommendations:

- The American adult population identified in the study as "sometimes users" and "infrequent users/likely to change" should be the major target groups of seat belt use media campaigns.

- Seat belt media campaigns should avoid straight information (statistical) themes.

- Seat belt use media campaigns should attempt to increase feelings of responsibility for seat belt use on the part of a vehicle's driver.

- The economic benefits which accrue from the cost of fastening one's seat belts should be emphasized in seat belt media campaigns.

- Seat belt media campaigns should emphasize the benefit-to-cost ratio operative at the moment of decision when an individual first sits in a vehicle. The three major benefits to be stressed should be: (1) avoidance of hospitalization and injury, (2) avoidance of being killed, and (3) avoidance of the "second collision."

- Seat belt use media campaigns should not be targeted at any one or two specific demographic or geographic groups.

- Seat belt use media campaigns must dispel the validity of the "trapped" myth, while at the same time avoiding "implanting" or suggesting it to individuals who may not have thought of it.

G. Overall Summary of Recommendations

In summary of these and other studies which have been conducted it appears that some of the more important considerations for any national effort to increase voluntary safety belt or child restraint usage are:

(1) **Many other groups and organizations have to be involved,** in the delivery and implemenation of educational, incentive and belt use policy programs.

(2) Automobile deaths and injuries must be perceived by the American public as a **public health problem.**

(3) The interest in **child passenger protection** should be capitalized on.

(4) **Economic costs** of belt non-use must be documented and presented in an effective manner to organizations and to the American public.

(5) **Incentives** must be provided to organizations and individuals to encourage increased belt usage.

(6) **Public information, education, incentive and belt use policy programs must be combined and implemented on a large scale over long periods of time by "networks" of organizations.**

(7) Many **different target groups** must be addressed in safety belt and child restraint messages and programs.

(8) A program based on **voluntary safety belt usage** must be undertaken before any serious interest can be given to a mandatory safety belt usage program.

VI. The NHTSA Safety Belt and Child Restraint Promotion Plan

A. Background

Based on these recommendations, NHTSA is implementing a comprehensive effort to increase safety belt and child restraint usage. This effort involves: (1) media programs; (2) educational (and incentive) networking efforts; (3) encouragement of organizational belt usage policies; and (4) research, development, and evaluation.

B. Goals and Elements

The goals of the program are to increase knowledge and positive attitudes toward safety belts and child restraints and to increase safety belt and child restraint usage rates in the States.

The elements of the program are: (1) to reach the majority of the public; (2) to inform them about the need for and effectiveness of safety belts and child restraints; (3) to persuade them to use their safety belts and/or child restraints (and to get others to do the same); and, (4) to reinforce such messages and efforts with constant reminders from many sources.

C. Networking

In the educational and incentive area, which constitutes a large portion of the program, efforts will be made to contact the national level associations for: (1) educational; (2) health; (3) medical; (4) civic; (5) safety; (6) business; (7) corporate; (8) government; (9) military; (10) insurance; (11) law enforcement; and (12) media networks to enlist their aid in promoting safety belt and child restraint programs among their State and local affiliates. In some cases, audiovisual and print materials will be supplied to such organizations to conduct these efforts. Some examples of how the program is expected to work are as follows:

(1) **Educators**: Elementary, high school, and driver education teachers will be provided curriculum units including audio-visual programs and will be urged to teach the dynamics of crashes and the effectiveness of safety belts and child restraints in classes.

(2) **Health Care Professional Groups**: Physicians groups will be asked to talk to patients on the need for safety belts and child restraints and work with hospitals and health clinics to educate patients. They will also be encouraged to exhibit community leadership through working with the media, public speaking, and endorsing child seat loaner programs.

(3) **Civic, Service, and Safety Groups**: There are a number of civic, service, and safety groups which are receptive to the need for increasing safety belt and child restraints usage. Most of these groups have a national association and a State (and local) affiliate network. Such groups

will be asked to promote safety belts and child restraint usage among their members through educational and incentive programs for the general public.

(4) **Employers (private, government, military):** The corporate network has one of the greatest potentials for increasing safety belt and child restraints usage, largely because of the great numbers represented by their employees. Private companies and corporations will be asked to adopt programs to educate their employees on the benefits of restraint usage and to establish belt usage policies for company employees.

Federal and State governmental agencies will be asked to establish policies requiring belt usage by their employees while they are on official business and to provide educational programs encouraging employees to use seat belts and child restraints at all times.

Motor vehicle accidents are the number one killer of military personnel during peace time. The military establishment will be asked to implement and enforce seat belt usage regulations applicable to all persons entering, while on, and leaving military posts, and to implement educational programs on safety belts and child restraint usage for military personnel, their dependents, and civilian employees.

(5) **Auto Companies and Trade Associations:** Safety should be as saleable as fuel economy. Auto manufacturers have advocated the use of safety belts for a number of years. As with other networks, auto companies and their trade associations will be asked to participate in the design of national public information programs. They will also be asked to influence their dealers to participate in safety belt and child restraint promotional efforts.

(6) **Insurance Companies:** Insurance companies will be asked to educate their policyholders and to explore the possibility of providing economic incentives in the form of reduced premiums for safety belt use. They will also be asked to participate in nationwide public information and education programs.

(7) **Law Enforcement Officials:** Police agencies will be asked to regularly report the use or nonuse of safety belts in crashes and to advocate the wearing of belts in their normal enforcement activities. Judges and lawyers will be asked to consider reduction in penalties where belt usage is involved and to re-examine the concept of contributory (or comparative) negligence where nonbelt usage is involved.

(8) **Electronic and Print Media:** The electronic media will be solicited to promote safety belt and child restraint usage. This includes public service time, talk shows, and special events. Top rated will be asked to explore this important societal problem as a potential theme in a programming efforts.

The print media will be solicited primarily through the editors and publishers of major magazines and newspapers to include safety belt usage information in the reporting of automobile crashes and to provide space for public service messages.

D. State Offices of Highway Safety

Perhaps the most important network through which NHTSA must operate is the network of State Offices of Highway Safety through which all Federal 402 funds are spent. Many of these State offices are already conducting "networking" efforts of their own in the child restraint area. To the extent that NHTSA can provide technical guidance and materials, and to the extent to which these State officials can coordinate and support those activities and materials being distributed through national organizations, the program will be successful. Figure 30 shows an example of how the NHTSA and the State offices of highway safety can interrelate with various organizational networks.

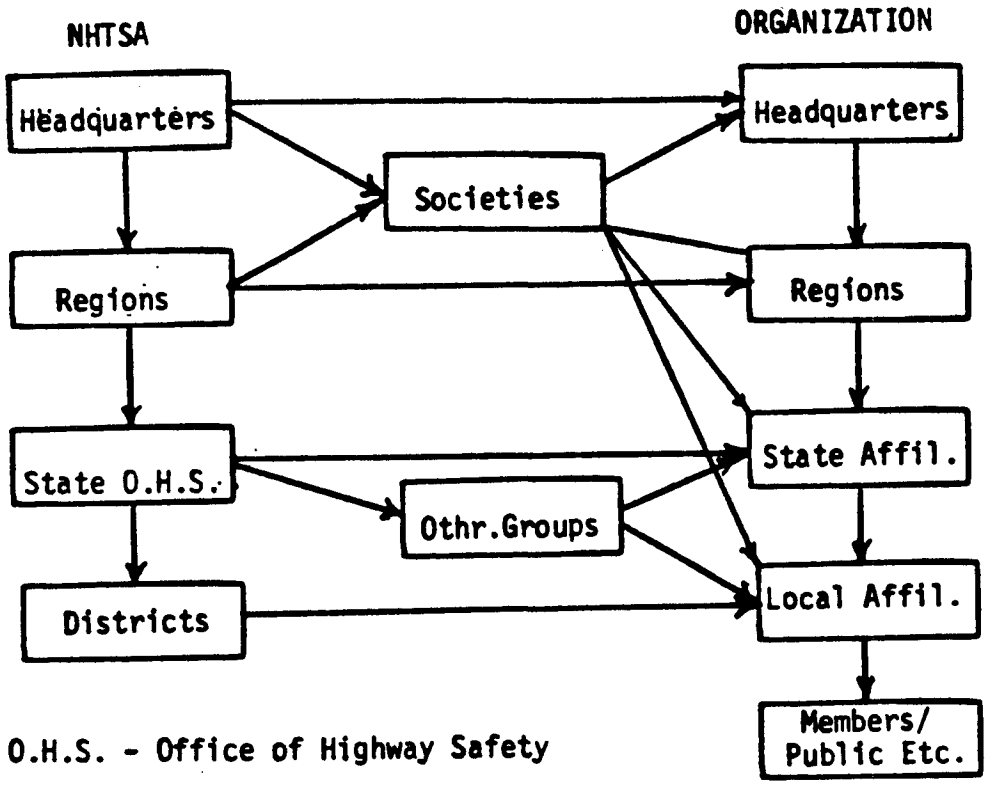


Figure 30
An Example of How Federal and State Highway Safety Agencies Must Interact With Organizational Networks

E. Message Development

Based on the motivational research cited in the body of this report, messages will be developed for distribution to both the educational and the mass media networks. These messages will be targeted for different segments of the population and will include such topics as: (1) function and/or effect of belts and child restraints; (2) status of highway crashes as a public health issue; (3) a driver's responsibility to his or her passengers, etc. An example of the development of messages for both networks and media purposes is shown in Figure 31.

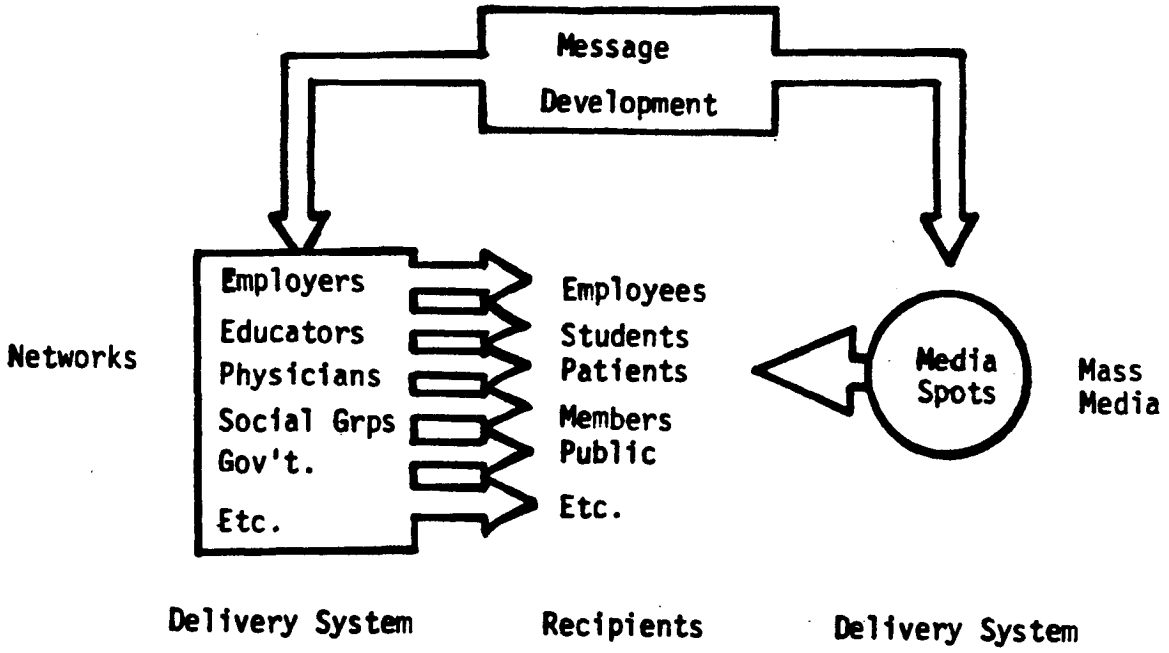


Figure 31
A Model for Message Development and Distribution in NHTSA Voluntary Safety Belt and Child Restraint Usage Program

The most likely messages being considered for development at this point in time include the following:

(1) Explaining the **function of the safety belt;** just how the belt works, how it keeps people restrained and helps to avoid or reduce injury if there is an accident and, therefore, why it saves lives. This also includes the changing of the name "seat belt" to "safety belt."

(2) **Everyone needs to wear safety belts and use child restraints** for their children. Factors such as why belts are a major safety feature, why other safety device or action are not substitutes and perception of crash and injury risks would be addressed.

(3) The problem of safety belt and child restraint nonuse is **a public health issue**. The use of such device is just as important as getting shots, exercising, or taking vitamins. It is an important and powerful form of preventative medicine.

(4) **Captain of the ship or leadership**. It is important for you and I to ask people to buckle their belts and use child restraints. It is our responsibility. It is socially acceptable. As drivers we have responsibilities towards our passengers.

As further research continues, new messages will be derived and utilized. The direction of the campaign will change as public attitudes and perceptions begin to change.

F. Time Phasing

To the extent possible, message delivery will be time-phased. It is important that time phasing take place so that new material is continually being introduced to the public and so that the effort does not stagnate.

Work is continuing on message development and on adding groups to the networking plan. Care will be taken not to oversimplify the long process of behavior-modification into a quick, catchy slogan rather than a well researched, thought-out series of messages and their delivery. Emphasis will be maintained on executing a systematic multi-faceted plan of attack.

G. Summary

In summary, some of the basic premises and approaches of the campaign should distinguish it from most past efforts to promote voluntary safety belt usage. They include.

(1) The **delivery of the messages**, materials and incentive programs will be accomplished through **organizational networks** that are already in place and which should be effective in molding and modifying attitudes and behavior. These organizations and social forces together touch nearly every American in one or more ways.

(2) The use of **mass media**, especially television, will be important in delivering messages, but primarily in a manner that **reinforces and provides support** to those being delivered through the organizational channels.

(3) The **messages** that are developed and used will be **based on thorough market (and product) research** and will reflect high quality and production.

(4) Finally, a the program will be based on the States' current interest and success in promoting **child restraint usage.** This program area is already reopening the minds of many persons to the need for restraints for all vehicle occupants.

VII. Past Indicators of State Priorities in the Safety Belt and Child Restraint Area

A. Workshop Indicators

One of the first indications of State priorities for activity in the safety belt and child restraint area comes from the initial 1979 workshop series on occupant restraints. During this workshop the States were asked which areas they would most like to place their resources. Nearly all the representatives of the States attending the workshops wanted to place their emphases on (1) child restraint programs; (2) public information programs; and (3) driver education programs.

B. State Resource Allocation

Another indication of where the States prefer to spend their 402 funds in the area of occupant restraints comes from an analysis of their programming efforts through the national project reporting system of NHTSA. A review of 1979 and 1980 programs revealed that the primary activity areas were:

- education programs
- public information programs
- infant and child restraint programs
- convincer demonstrations
- surveys

1. Education Programs

Providing instructional materials for public schools was the primary activity in the education program area. Materials such as "Beltman" kits (by far the most popular item), "Do You Buckle Up?," and "Safety Steps" as well as numerous films had been purchased and targeted at elementary school audiences. Brochures, pamphlets, and other informative materials, in addition to films, were being provided to secondary school driver education classes.

From a preliminary analysis, over 1,000 schools and school districts were the recipients of these materials with many more schools and other organizations having access to the materials through libraries and media centers. Instructional materials were being used by elementary and secondary teachers to support and supplement regular curriculum activities. Moreover, in some States, "safety officers" from local law enforcement agencies utilized the materials purchased by coming into the schools to present special safety belt usage programs.

In-service training for teachers was also provided. Workshops were held to acquaint teachers wih new materials and provide a forum to exchange ideas on how to best structure new learning activities into the existing curriculum.

Approximately 15-30 percent of FY 1979 and 1980 safety belt funds was used for education programs.

2. Public Information Programs

Activities in the public information program area attempted to utilize various forms of mass media in order to convey a safety belt usage message. A large portion of funds were spent creating and presenting TV and radio spots. Contractors for these activities were usually public relations firms or State universities with media production capabilities. Other activities funded in this program area included developing and distributing various printed materials, conducting training conferences for various organizations relating to how public information projects can be developed, and contracting for billboards and bus posters.

The proportion of funds used for public information ranged from 25-50 percent.

3. Infant and Child Restraint Programs

Infant and child restraint projects made up a vital part of the safety belt usage program. Generally, projects included: public information and education, loaner programs, and legislation. Materials and media campaigns were planned and developed. States provided educational materials, and in some cases, training to hospital personnel on how to inform parents and parents-to-be about safety belt usage. Child restraint programs designed specifically for pediatricians were also developed. Further, States sponsored displays and exhibits of approved infant and child safety car seats at numerous public places.

A substantial area of activity has been the restraint "loaner" programs, designed to increase restraint usage by getting child safety seats into the hands of parents. Projects involve the purchase of car seats and the loan of them to parents for a small deposit.

The States have also supported efforts aimed at introducing and passing child restraint laws. Activities include making model legislation and other materials concerning child restraints available to State legislators.

Approximatey 25-35 percent of FY 1979 and 1980 funds was used in this program area.

4. Convincer Demonstrations

Years before the Highway Safety Act of 1978 was enacted, States were encouraging the use of safety belts by demonstrating the safety belt "convincer," which graphically shows what might happen to an unrestrained driver or passenger during a low speed crash of about 10 mph. States purchased more "convincers" with earmarked funds and stepped up their demonstration schedules. The "convincer" was usually demonstrated at shopping centers, fairs, and other public gatherings.

Less than ten percent of FY 1979 and 1980 funds has been used to fund convincer demonstrations.

5. Surveys

Many States conducted surveys to identify more clearly the nature of the safety belt usage problem. From survey results, projects could be targeted toward special emphasis areas and certain target populations. In this manner, funds could be allocated for the largest payoff in terms of increased safety belt use.

Surveys usually took one or more of the following forms:

- Usage -- documenting the actual number of driver and passengers (adult and child) who buckle up.
- Knowledge -- finding out what drivers and passengers know and don't know about safety belts.
- Attitude -- discovering the reasons why people believe they don't need safety belts and the myths they hold about the dangers of belt use.

The States spent 10-20 percent of their FY 1979 and 1980 safety belt usage funds for surveys.

6. Miscellaneous

Many States initiated projects that were not easily placed in one of the program areas previously described. Nevertheless, many of the projects were innovative and represented a payoff potential. Examples of miscellaneous projects were:

- Scheduling town meetings with safety belt usage as the main topic.
- Holding a statewide conference on safety belt usage.
- Providing in-service workshops for State employees.
- Purchasing and distributing bookbags and keyrings wth a belt message.
- Conducting safety belt "logo" contests.
- Presenting safety belt "T-shirts" to those drivers and passengers observed wearing belts while driving.
- Making presentations to volunteer groups, employee groups, etc.

Many of the above programs appear to fall in line with suggestions made by past studies and by the review of major countermeasure efforts. What has also been apparent in recent years has been an ever-increasing use being made of the many organizational networks available for conveying safety belt and child restraint messages. Some States are developing reasonably complex and comprehensive educational networks.

However, no State presently has a comprehensive mass media, education, incentive, employer and/or legislative program aimed at safety belt usage. Some are approaching such a comprehensive program in the area of infant and child restraints.

C. Private Sector and State Responses to the 402 Rulemaking Docket (No. 81-12, Notice 1)

Further indications of how the States (and other organizations) feel about 402 funded activities in the occupant restraint area can be obtained from the responses received to Docket 81-12, Notice 1. In general, the comments received reflected more what States have been doing or were planning to do in this area, rather than an analysis of the importance they felt the area deserved.

An examination of the responses to the docket indicated considerable interest in the occupant restraint area. Many of the comments were general in nature. All recognized the importance of programs aimed at encouraging restraint use, whether the restraint is for a child or for an adult.

1. Private Sector Responses

Among the commentors from the private sector, the President of the National Safety Council (NSC) stated that his organization supported the six emphasis areas for 402 funds, including occupant restraints. The President of the Motor Vehicle Manufacturers Association (MVMA), commended "the DOT for its initiative in planning a national campaign for (the purpose of increasing belt usage)" and the Executive Director of the American Association of Motor Vehicle Administrators recognized the effectiveness of safety belt use.

Several commentators called for mandatory safety belt or child restraint laws. They included the President of the Traffic Safety Association of Detroit, an orthopaedic surgeon and a member of the American Academy of Pediatrics. The American Seat Belt Council urged DOT to reinstate an incentive grant program for States which pass safety belt laws and reduce fatalities.

Relative to voluntary usage approaches, a private citizen from Cameron, Louisiana and a member of the American Trauma Society both supported the implementation of public information programs to spread the safety belt message. Similarly, a Maryland resident suggested a media campaign and a public education effort with an emphasis in driver education programs and greater enforcement with public employees.

2. State Responses

As has already been indicated, the States have spent much of their funds on child restraint programs, although some has gone toward encouraging safety belt use. In general contributions to the docket from various States outlined past, present, and future efforts in this area. A summary of State comments is as follows:

(a) **Mississippi** -- The State began a successful pilot child restraint loaner program in FY 1981 and will have four additional programs in FY 1982. A Traffic Safety Association has been formed in the State to promote restraint use policies and legislation. A statewide safety belt education program for second and third graders will be implemented. The program was begun in FY 1981. Pre-and post-tests have demonstrated changes in knowledge and behavior of the students.

(b) **Oregon** -- The State obligated $86,000 toward safety belt use encouragement. Portland bought a display to promote safety belt use and traffic safety. A convincer was purchased in 1978 and is still being used at schools and fairs. One county began a loaner program in 1979.

(c) **Ohio** -- One of Ohio's seven current priority projects is an infant/toddler restraint program. The State has actively promoted KISS (Kids In Safe Seats). By the end of FY 1982 Ohio expects that over 50 percent of new mothers will have received educational material and/or loaned seats as a result of the program. Over 30 percent of the hospitals have at least an educational program, if not a loaner program. The cost is less than $3,000 per hospital. While the figures are not firm, it appears that the increase in child seat use where the program is active is five to ten percent.

(d) **Maine** -- Maine has a convincer program together with a new child restraint law. It expects that they will provide an excellent opportunity to save lives.

(e) **Virginia** -- An emergency public information campaign was begun in Virginia. The result was that during the 1980 Christmas and New Year's weekends traffic fatalities were almost half the number of the previous year. The State recommended that special attention be paid to safety belt and child restraint use by focusing on:

- health care providers
- the general public
- child restraint loaner programs

(f) **Iowa** -- Iowa established over 160 loaner programs statewide in FY 1981. On-site surveys show that child restraint use was up from approximately three percent to about 28 percent by the end of the program's first year. Traffic deaths for children four and under went from 15 in 1979 to nine in 1980. The entire cost from the 402 funds was $35,900. It was pointed out that this project would be cost-effective if just one child's life was saved.

(g) **Pennsylvania** -- This State believes that a child restraint program has high potential. Pennsylvania is working with the Jaycettes and other volunteer groups to set up a statewide network of community loaner programs. It was stated that "The program will be long on results and short on administrative overhead."

(h) **Michigan** -- The Michigan submission stated that of the five programs having a direct impact on reducing accidents and accident severity, the occupant restraints program is third in effectiveness.

(i) **California** -- This State urges "the expansion of the approved program areas to include at a minimum the maintenance of occupant restraint usage activities."

California felt that occupant restraint programs "provide the most immediate and measurable potential for minimizing death and injury from traffic accidents." If there is a silver bullet in highway safety this is it stated the submitter. State activities which cannot continue if Federal funds are withdrawn would include evaluation of approaches to increase usage and coordination of organizational networks in the child restraint area.

(j) **Rhode Island** -- Rhode Island suggests ten emphasis areas, with safety belts ranked fifth. A public information and education and research effort is called for, along with the possibility of a national safety belt use law.

(k) **Colorado** -- The Colorado report stated that since 1966, 3,800 lives have been saved and 84,000 injuries prevented due to Colorado's occupant restraint efforts. The State had an unsuccessful attempt to pass child restraint legislation. However the effort sparked a lot of activity. There will be a statewide seminar of all groups interested in promoting child restraint use. It is anticipated that the seminar will produce more activity in 1982. Colorado also holds an annual child restraint poster contest.

(l) **Illinois** -- Illinois lists the promotion of safety belts as a potentially effective program. It has used 402 funds for this purpose since 1979. In addition, in Illinois 22 hospitals provide educational material to parents of new born children. Twenty-five community projects and five hospitals distribute safety seats.

In general, the greatest amount of activity was in the area of child restraint loaner programs. Federal funding provided the necessary seed money and local communities were often able to take over from there. Additional funding will be needed in the future for expansion into new States and more communities in the States that have programs.

Many comments recognized the value of comprehensive education and information programs, though few such programs are in existence. Importance was also placed on research and evaluation efforts.

SAFETY BELT BIBLIOGRAPHY

1. Adams, J., The Efficiency of Seat Belt Legislation: A Comparative Study of Road Accident Fatality Statistics From 18 Countries. Unpublished. Department of Geography, University College, London, England, 1981.

2. Agrell, A., and Johansson, S.A., Sakerhetsballesanuandning-en experimentell Studie av oliko panerkansmetoder. Uppsala Universitet, Psykologiska Institutwnen, Sweden 1972.

3. Aiken, H.J., Ontario Seat Belt Law. Ontario Ministry of Transportation and Communications, Dawnsview. July 13, 1976, 27 p.

4. Allen, D.B. and Bergman, A.B., Social Learning Approaches to Health Education: Utilization of Infant Auto Restraint Devices. Children's Orthopedic Hospital and Medical Center. Seattle, Washington University. Seattle, Pediatrics, Vol. 58, No. 3, September 1976 pp. 323-328.

5. American Automobile Association Member's Opinions on Issues of Importance, Automobile Driving and Travel Habits. Washington, DC, March 1977.

6. American Institute for Research, National Program to Encourage the Use of Restraint Systems. NHTSA, DOT FH-75222, 1971.

7. American Seat Belt Council, Safety Belt Use Abroad. Washington, D.C., 1976

8. American Seat Belt Council, International Seat Belt and Child Restraint Laws. Washington, D.C., April, 1981.

9. Berg Electronics. An Unpublished Report on a Campaign to Increase Safety Belt Usage, Fishing Creek, Pennsylvania, 1980.

10. Bigelow, B., Review of Programs Designed to Encourage Use of Safety Belts. National Highway Traffic Safety Administration, Report Prepared for the Special Committee of the Transportation Research Board, 1979.

11. Blomgren, G.W. Jr., and Scheumeman, T.W., Psychological Resistance to Seat Belts. Northwestern University, Traffic Institute, Evanston, 1961.

12. Bohlin, N.I., A Statistical Analysis of 28,000 Accident Cases with Emphasis on Occupant Restraint Value. Eleventh Stapp Car Crash Conference Proceedings, Society of Automotive Engineers, New York, N.Y., U.S.A. 1967. pp 299-308.

13. Bragg, B.W.E., Attitudes Towards, and Effectiveness of Mandatory Seat Belt Legislation in Canada. Paper presented at 6th International Conference of the International Association for Accident and Traffic Medicine, Melbourne, Australia, February, 1977.

14. Butynski, W., An Attempt to Measure and Change Drivers' Attitudes and Behavior Toward Seat Belt Use. Vermont University, Burlington. October 1973. p 176, Order Number University Microfilms, 74-2812.

15. Campbell, B.J., Seat Belts and Injury Reduction in 1967 North Carolina Automobile Accidents, Technical Report. University of North Carolina, Highway Safety Research Center, Chapel Hill, North Carolina 1968.

16. Center for Environment and Man, Inc., Statistical Evaluation of the Effectiveness of Child Restraints, NHTSA Contract DOT-HS-8-02014, September 1980.

17. Comptroller General of the United States, Effectiveness, Benefits, and Costs of Federal Safety Standards for Protection of Passenger Car Occupants. Report to the Committee on Commerce, United States Senate, General Accounting Office, Washington, D.C., Report No. CED-76-121, 1976.

18. Consumer Reports, Infant Carriers and Child Restraints. Consumer Reports Vol. 40 No. 3., March 1975, pp. 150-2

19. Costiloe, P., and Crosby, W. M., The Effect of Lap Belt Restraint on Pregnant Victims of Automobile Collisions. Oklahoma University FH-11-7339 Publication: Proceeding of 14th Annual Conference of the American Association for Automotive Medicine 1970 pp. 97-110.

20. Council, F.M., and Hunter, W.W., Seat Belt Usage and Benefits in North Carolina Accidents. University of North Carolina, Chapel Hill. 1974

21. Croft, P.G., The Use of Occupant Restraint Devices. Traffic Accident Research Unit Report, New South Wales, Australia, 1977.

22. Cromack, J.R., and Mason, R.L., Restraint System Use and Misuse. Southwest Research Institute, San Antonio. In D.F. Huelke, Ed., American Association for Automotive Medicine. 20th Conference Proceedings. AAAM, 1976, pp. 367-381.

23. Crosby, W.M., and Costiloe, J.P., Safety of Lap Belt Restraint for Pregnant Victims of Automobile Collisions. The New England Journal of Medicine, May, 1971, Volume 284, No. 12, pp. 632-636.

24. Dalgaard, J.B., Experiences with the New Seat Belt Law on Fatal Lesions of Car Occupants in Denmarks in: Proceedings of the 6th International Conference of the International Association for Accident and Traffic Medicine, Melbourne, Australia, February 1977.

25. DeLavenne, H., French Developments of Restraint Means. Renault-Peugot Association (France). HS-820-217, 1972.

26. Dubarry, B., and Chadkiewicz, J.P., The Effects of Mandatory Seat Belt Legislation in France. International Association for Accident and Traffic Medicine, 1977.

27. Elmen, D., and Killebrew, T.S., Incentives and Seat Belts: Changing a Resistant Behavior Through Extreme Motivation. Journal of Applied Social Psychology, 1978 pp. 8, 72-83.

28. Energy Resources Council, Report by the Federal Task Force on Motor Vehicle Goals Beyond 1980, Washington, D.C., September 1976.

29. Evans L., Wesielewski, P., VonBuseck, G.R., Compulsory Seat Belt Usage and Driver Risk Taking Behavior. Human Factors, in press.

30. Edvardsson, K., and Degermark, M., The Use of Seat Belts in Motor Vehicles in Sweden 1971-1975--Effects of Campaigns and Legislation. The Swedish Road Safety Office, Analysis Office, Report No. 35, August 1976.

31. Fabry, R., Campaign Case History, Seat Belts 1971. Great Britain Department of the Environment, London, 1973.

31a. Hull E., personal communication to NHTSA on the British Safety Belt Campaign, Department of Transport, London, October, 1979.

32. Faigin, B., Societal Costs of Motor Vehicle Accidents. National Highway Traffic Safety Administration, DOT-HS-802-119, December 1976.

33. Fhaner, G., and Hane, M., Seat Belts-Factors Influencing Their Use--A Literature Survey. Accident Analysis and Prevention. V. 5 (1) April 1973.

34. Fhaner, G., and Hane, M., Seat Belts: Relations Between Beliefs, Attitude and Use. Statens Trafiksakerhetsverk, Driver License and Research Department, Solna, Sweden, February 15, 1973, p. 87.

35. Fhaner, G., and Hane, M., Seat Belts: The Importance of Situational Factors. National Swedish Road Safety Office, 1972.

36. Fhaner, G., and Hane, M., Seat Belts: Changing Usage by Changing Beliefs. Upsala University. Journal of Applied Psychology, V. 60 (5) October 1975.

37. Fleischer, G.A., An experiment in the use of broadcast media in highway safety: systematic analysis of the effect of mass media communication in highway safety. Final report. University of Southern California, Department of Industrial and Systems Engineering. December 1971, (See also: Journal of Safety Research, Vol. 5, No. 1, March 1973, pp. 3-11).

38. Freedman, D., Wood, R., and Henderson, M., Compulsory Seat Belts: A Survey of Public Reaction and Stated Usage. New South Wales Department of Motor Transport, Traffic Accident Research Unit, Sydney, Australia, June 1974.

39. Freedman, K., and Ludin, J., Occupant Protection for Children: A Survey of Restraint Usage Attitudes and Knowledge. Department of Motor Transport. New South Wales, Sydney, Australia, August, 1977.

40. Freedman, K., and Lukin, J., Increasing Child Restraint Usage in New South Wales, Australia: The Development of an Effective Mass Media Campaign. In: Proceeding of American Association of Automotive Medicine 35th Annual Conference AAAM, October 1981.

41. Gallup Organization, Inc. Attitudes of New Jersey Residents Toward Legislation Requiring Use of Safety Belts in Cars. Princeton, New Jersey, Report # GO-7774, 1977.

42. Geller, E.S., Johnson, R.P., and Pelton, S.L., Community-Based Intervention for Encouraging Safety Belt Use, American Journal of Community Psychology, in press.

43. Geller, E.S., Development of Cost Effective Incentive Strategies for Motivating Safety Belt Usage. NHTSA contract in process.

44. Geller, E.S., Cesali, J.G., and Johnson, R.P., Seat Belt Usage: A Potential Target for Applied Behavior Analysis. Journal of Applied Behavior Analysis, 1980, pp. 4, 94-100.

45. Geller, E.S., Casill, J.G., and Johnson, R.P., Interventions for Encouraging Seat Belt Usage. Virginia Polytechnic Institute and State University, Blacksburg, November 1979.

46. Green, P.G., Ontarios Buckle-Up Law is Paying Off. First Quarter Accident Statistics Show Dramatic Reduction in Fatalities and Injuries. Traffic Safety, Vol. 76, No.7. July 1976, pp. 8-11, 34-35.

47. Grey Advertising, Inc., Media Policy Can Save Lives; A Plea to Communicators. Draft-Report. Grey Advertising Agency Inc., Washington, D.C., July 20, 1976.

48. Grimm, A.C., Public Attitudes on Restraint System Usage University of Michigan, Highway Safety Research Institute, 1977.

49. Grimm, A.C., Public Information Campaigns on Restraint Usage. University of Michigan, Highway Safety Research Institute, 1977.

50. Hart, Peter D., Public Attitudes Toward Passive Restraint Systems. Hart Research Associates DOT-HS-803-570, August 1978.

51. Henderson, M., and Wood, R., Compulsory Wearing of Seat Belts in New South Wales, Australia: An Evaluation of its Effect on Occupant Deaths in the First Year. Department of Motor Transport, New South Wales, Sydney, Australia, August 1973.

52. Henderson, M., and Freedman, K., The Effect of Mandatory Seat Belt Use in New South Wales, Australia. Department of Motor Transport, 52-56 Rothschild Ave., Roseberry, Sydney 2001, Australia, March 1974.

53. Heron, R.M., Attitudes of Canadians Towards Legislation Requiring Mandatory Use of Seat Belts. Canadian Ministry of Transport, Road and Motor Vehicle Traffic Safety Office, Ottawa, September 1976.

54. Heron, R.M., Attitudes Toward Seat Belts. Canadian Ministry of Transportation and Communications, Road and Motor Vehicle Traffic Safety Division, Ottawa Ontario, October 1975.

55. Heron, R.M., The Canadian Approach to the Seat Belt Problem, Report No. 770153, Queen's University, Kingston, Department of Psychology, 1977.

56. Huelke, D.F., Effectiveness of Occupant Restraints in Reducing Injuries and Fatalities in: Proceedings of International Symposium on Occupant Restraint. Toronto, American Association for Automotive Medicine. June, 1981.

57. Huelke, D.F., Lawson, T.E., Marsh, J.C., and Scott, R., The Effectiveness of Belt Systems in Frontal and Rollover Crashes. University of Michigan Highway Safety Research Institute, Ann Arbor, Michigan, January 1977.

58. Huelke, D., Study of 139 Accidents Involving 177 Fatalities, University of Michigan, Highway Safety Research Institute, 1961.

59. Human Collision. Ministry of Transportation and Communications, Ontario, Canada, 1976.

60. Insurance Institute for Highway Study Reveals High Risk for Infant Riders in Cars Status Report. V.14(5), March 1979.

61. Jatras, K.P., Life Saving Potential of Greater Safety Belt Usage. Office of Statistics and Analysis, National Highway Traffic Safety Administration, HS-802-002. 1976.

62. Jessee, K., Survey to Determine the Influence of the Seat Belt Convincer on Seat Belt Usage by the General Public. Governor's Highway Safety Office, State of Missouri, December 1975.

63. Johnson, Lawrence and Associates, Demographic, Situational and Motivational Factors Associated with the Use of Safety Belts. Contract in progress.

64. Johnson, R.P, and Geller, E.S., Contingent versus Non-contingent Rewards for Promoting Seat Belt Usage. Journal of Community Psychology, 1981.

65. Joubert, P.N., "Development and Effects of Seat Belt Laws in Australia in: International Symposium on Occupant Restraint Proceedings, American Association for Automotive Medicine June, 1981.

66. Kihlberg, J.K., Efficacy of Seat Belts in Injury and Non-Injury Crashes in Rural Utah. Report VJ-2721-R3, Calspan, P.O. Box 235, Buffalo, N.Y. 14221, May 1969.

67. Lankard, T., California Office of Highway Safety, Submission to Docket 81-12; Notice 1; November, 1981.

68. Levine, D.N., and Campbell, B.J., Effectiveness of Lap Seat Belts and the Energy Absorbing Steering System in the Reduction of Injuries (Technical Report). University of North Carolina Highway Safety Research Center, Chapel Hill, North Carolina, 1971.

69. L'Hoste, J., and Labadie, M.J., Conception and Experimentation with a Campaign to Induce Seat Belt Usage. Organisme National de Securite Routiere, Paris October 1973, (document in French).

70. Lincorp Research Inc., Seat Belt Education Program. Post-advertising Test Summary Report. Lincorp Research, Inc. Southfield, Michigan June 1977.

71. Livingston, C., Fee, D., Knaff, R., Ziegler, P., Nichols, J., Trilling, D., Voas, R., and Womack, J. Task Force Report on Safety Belt Usage Laws. National Highway Traffic Safety Administration, June 1978.

72. Lonero, L.P., Gardner, N., Pang, H., Pierce, J., Toomer, M., and Young, P., Evaluating the Effects of Seat Belt Information and Legislation in Ontario. Ontario Ministry of Transportation and Communications Systems Research Branch, Toronto, American Association for Automotive Medicine 20th Conference Proceedings AAAM, 1976, pp.416-429.

73. Lonero, L.P., and Pierce J.A., "History and Evaluation of Seat Belt Legislation in Ontario" in: International Symposium on Occupant Restraint Proceedings Toronto Canada, American Association for Automotive Medicine, 1981.

74. Lonero, L.P., Wilson, W.T., and Ish, D.M., The Seat Belt Education Project RR187. Ministry of Transportation and Communications, Research and Development Division, Downsview, Ontario, Canada, 1973.

75. Mackay, G.M, Seat Belts in Europe Their Use and Performance in: International Symposuim on Occupant Restraints Proceedings. American Association for Automotive Medicine, 1981.

76. Man Factors, Inc., Sources and Remedies for Restraint System Discomfort and Inconvenience. National Highway Traffic Safety Administration, Report DOT-HS-7-01617.

77. Market Facts, Safety Belt Campaign in Pennsylvania. Pennsylvania Governor's Traffic Safety Office, 1980.

78. Market Opinion Research, An Analysis of the Factors Affecting Seat Belt Use General Motor Corp., December 1977.

79. McNabb, S., Motivation of Automobile Dealer to Participate in Encouraging Safety Belt Use. NHTSA contract in progress.

80. Mela, D.F., Review of Safety Belt Usage and Effectiveness in Accidents. National Highway Traffic Safety Administration, Office of Statistics and Analysis. HS-016-277, 1974.

81. Michigan Office of Highway Safety Planning, Protecting Your Assests: A Program for Government and Industry to Reduce Losses from Auto Accidents by Increasing the Use of Safety Belts. Michigan Office of Highway Safety Planning, Lansing, no date.

82. Mohan, A., Zador, P. Neill, B., and Ginsburg, M., Air Bags and Lap/Shoulder Belts--A Comparison of Their Effectiveness in Real World, Frontal Crashes. Insurance Institute for Highway Safety, Washington, D.C., September 1976.

83. Moon, J., and Nicol, J., The Neglected Child Syndrome: The Infant and Child in Automobile Collisions. Children's Automobile Safety Research Committee, Consumer's Association of Canada, Toronto, Ontario, Canada, 1974.

84. Motorists Information Inc. Michigan Safety Belt Project, Detroit, Michigan. April 1978.

85. National Analysts, Motivating Factors in the Use of Restraint Systems NHTSA, Final Report HS-800-585, 1971.

86. National Public Services Research Institute Supplemental Driver Safety Program Development. Second Interim Report NHTSA Contract DOT-HS-9-02284, September 1981.

87. National Highway Safety Advisory Committee, Factors Associated with Child Use of Automobile Restraining Devices: Knowledge, Attitudes, and Practice. National Highway Safety Advisory Committee, Washington, D.C., 20590, 1974.

88. National Highway Traffic Safety Administration, The National Highway Safety Needs Report. U.S. Department of Transportation, NHTSA, 1976.

89a. National Highway Traffic Safety Administration, Final Regulatory Impact Analysis: Amendment to FMVSS 208, Occupant Crash Protection U.S. Department of Transportation, DOT-HS-806-055, October, 1981.

89b. National Highway Traffic Safety Administration, Highway Safety Programs; Determination of Effectiveness NHTSA Docket No. 81-12; Notice 2, Notice of Proposed Rulemaking, U.S. Department of Transportation, January 1982.

89c. National Highway Traffic Safety Administration Preliminary Regulatory Evaluation of Highway Safety Programs: Determination of Effectiveness Plans and Programs, Office of Program and Rulemaking Analysis, January 1982.

90. National Highway Traffic Safety Administration, Safety Belt Usage: A Review of Effectiveness Studies. NHTSA, Department of Transportation, Washington, D.C., August 1976.

91. National Highway Traffic Safety Administration, National Safety Belt Usage Conference, Washington, D.C., Proceedings 1974.

92. National Safety Council, Policy Update (On Child Restraint Legislation), Washington, D.C., October 1981.

93. New Jersey Office of Highway Safety Year End Review to the National Highway Traffic Safety Administration, December 1981.

94. O'Day, J., State Legislation and Occupant Restraints, In: Proceedings of International Symposium on Occupant Restraints American Association for Automotive Medicine, June 1981.

95. Nichols, J.L., A Review of Issue Related to NHTSA's Safety Belt Usage Effort, NHTSA, 1979.

96. Nordic Road Safety Council, Inducements to Increase Safety Belt Usage. Nordisk Trafiksikkerheds Rad., Stockholm, Sweden, HS-020-167, Report No. 11A, 1975.

97. Oakland County, Michigan, Traffic Improvement Association A Report on the Activities and Measured Effectiveness of a Public Education Program for Safety Belt Use, October 1969.

98. Opinion Research Corporation, Safety Belt Usage: Survey of Cars in the Traffic Population (November 1977 - December 1979). Opinion Research Corporation, NHTSA, DOT-HS07-01736, December 1979.

99. Opinion Research Corporation Restraint System Usage in the Traffic Population, NHTSA Contract DTN22-80-C-07283 Progress Report, November 1981.

100. Opinion Research Corporation, Safety Belt Use Among Drivers, Final Report NHTSA Contract DOT-HS-805-398, May 1980.

101. Opinion Research Corporation, Safety Belt Mass Media Campaign. Opinion Research Corporation, Princeton, N.J. 08540, NHTSA, DOT-HS-7-01736, 1977.

102. Parsons, Mel., Incentives and Disincentives in Seat Belt Usage. Transportation Research Board, November 23, 1979.

103. Peat, Marwick, Mitchell and Company, Effectiveness of Safety Belt Usage Laws. NHTSA, DOT-HS-805-490, May 1980.

104. Perceptronics, Inc., Perceptions of Risk as a Way of Increasing Voluntary Safety Belt Use. NHTSA Contract DTNH22-80-C-17096, In progress.

105. Perry, L., Heathington, K.W., Philpot, c., Peritz, A. and Lo, M., Impact of Child Passenger Restraint Law and a Public Information and Education Program on Child Passenger Safety in Tennessee. Transportation Center, University of Tennessee, Knoxville, NHTSA HS-805-690, October 1980.

106. Phillips, B.M., Safety Belt Education Program for Employees: An Evaluation Study. Final Report, U.S. Department of Transportation, Washington, D.C., DOT-HS-7-01707, June 1980.

107. Pier, B.F., Sources and Remedies for Restraint System Discomfort and Inconveniences. Final Briefing. Man Factors, Inc. San Diego, California HS-801-277, November 1974.

108. Pryor, A., An Investigation of the Effect of the Oakland County Multi-Media Safety Belt Campaign. Highway Safety Research Institute, Ann Arbor, October 1970.

109. Pulley, C., and Johannesson, G., Examination of Safety Belt Use. American Seat Belt Council, Transportation Research Board, January 1982.

110. Reinfurt, D.W., Silva, C., and Seila, A.F., A Statistical Analysis of Seat Belt Effectiveness in 1973-1975 Model Cars Involved in Towaway Crashes. U.S. Department of Transportation, National Highway Traffic Safety Administration, Washignton, D.C. 1976.

111. Reisinger, K.S. and Williams, A.F., Evaluation of Programs Designed to Increase the Protection of Infants in Cars, Insurance Institute for Highway Safety, Washington, D.C. 1977.

112. Reisinger, K.S.; Williams, A.F., Wells, K., John, C.F., Roberts, T.R., and Podgain, H.J., Effect of Pediatricians' Counseling on Infant Restraint Use, Insurance Institute for Highway Safety, Washington, D.C. 1980.

113. Roberts, Gene, "Child Passenger Protection: The Tennessee Enforcement Strategy. In Proceedings of International Symposium on Occupant Restraints. American Association for Automotive Medicine, June 1981.

114. Robertson, L.S., and Williams, A.F., Some International Comparisons of the Effects of Motor Vehicle Seat Belt Use and Child Restraint Laws Insurance Institute for Highway Safety Washington, D.C., May 1978.

115. Robertson, L.S., Increased Motor Vehicle Crash Protection: Public Preferences and Willingness to Pay. Insurance Institute for Highway Safety, August 1976.

116. Robertson, L.S., Kelley, A.B., O'Neill, B., Wixom, C.W., Eiswirth, R.S., and Haddon, W., Jr., A Controlled Study of the Effect of Television Messages on Safety Belt Use. Insurance Institute for Highway Safety, American Journal of Public Health, Vol. 64, No. 11, November 1974.

117. Robertson, L.S., O'Neill, B., and Wixom, C.W., Factors Associated with Observed Safety Belt Use. Journal of Health and Social Behavior, 1972, Vol. 13, pp. 18-24.

118. Rochon, J., An Evaluation of the Seat Belt Education Campaign. Transport Canada, Report TP 977 CR 7707, April 1977.

119. Rogers, R.A., Silvers, J.N., "Elements of an Effective Child Restraint System." In: Proceedings of Twelfth Stapp Car Crash Conference, Detroit, Michigan, 1968, pp. 172-187.

120. Ryon, D. and States, J.D., Restraint Systems in Racing Accidents. Rochester University, New York, Orthopaedic Surgery Division, Report No. SAE 690246, 1969.

121. Scherz, R.G., Washington State Seat Belt Study 1970-77. Summary of Statistics on the Children Age 0-15 Years Who Were Passengers in Motor Vehicles Involved in Accidents. Mary Bridge Children's Health Center, Tacoma, Washington, 1978.

122. Scherz, Robert G., Restraint Systems for the Prevention of Injury to Children in Automobile Accidents. American Journal of Public Health 1976, Vol. 66, No. 5, pp. 451-6.

123. Seidenstecker, K. Laws on Mandatory Seat Belt Use and Their Enforcement in the Federal Republic of Germany, in: International Symposium on Occupant Restraints: Proceedings, American Association for Automotive Medicine, 1981.

124. Sengbusch, L.A., Oros, C.J., and Elmen, D., Decision Process and Self-detrimental Behavior: The Effects of Probability and Magnitude of Consequences on Safety Belt Usage. Paper presented at the meeting of the Mid-Western Psychological Association, Chicago, May 1979.

125. Senk, S.A., and Schwartz, S.L., Evaluation of the Effects of a Seat Belt Education Program Among Elementary School Children in Loudon County, Virginia. Final Report. National Analysts, Inc., DOT-HS-800-766 November 1972.

126. Shackson, R.H., Inducements to Increased Safety Belt Usage. Ford Motor Company, Dearborn, 13 July 1976.

127. Shortridge, R.M., A Comparison on Injury Severity Patterns for Unrestrained, Lap Belted and Torso Restrained Occupants in Automobile Accidents. HS-014519, Proceedings of 17th Conference of the American Association for Automotive Medicine, Oklahoma City, Oklahoma, 1973, pp. 130-147.

128. Siegel, A.W., VanWagoner, W.T., and Nahum, A.M., Case Comparisons of Restrained and Nonrestrained Occupants and Related Injury Patterns. California University, Los Angeles School of Medicine, No. SAE-690245, 1969.

129. Simpson, H.M. and Warren, R.A., "Seat Belts and Traffic Safety: The Canadian Experience" In: Proceedings of International Symposium on Occupant Restraints American Association on Automotive Medicine, June 1981.

130. Sontag, D., Heathington, K.W., and Lo, M., Enforcement of the Child Passenger Protection Law. Transportation Center, the University of Tennessee, Knoxville, HS-805-802, October 1980.

131. State of Iowa, Department of Transportation, Report to Regional NHTSA Administrator on project PSP Title 81-08-01 Task 2, November, 1981.

132. State of Missouri, Office of Highway Safety, a report to FLJ Learning Systems on the evaluation of the Beltman Program, 1981.

133. Stowell, C., and Bryant, J., Safety Belt Usage: Survey of the Traffic Population. Kirschner Association, Inc., DOT-HS-803-354, January 1978.

134. Tarrance and Associates, National Safety Belt Study. NHTSA Contract DTNH22-81-C-05224 September 1981.

135. Teknekron Inc., Occupant Restraint Legislation Handbook: A Guide for Proponents. National Highway Traffic Safety Administration, DOT-HS-804-780 February 1979.

136. Teknekron, Inc., 1978 Survey of Public Perceptions on Highway Safety. DOT-HS-803-719, November 1978.

137. Teknekron Inc., 1979 Survey of Public Perceptions on Highway Safety. National Highway Traffic Safety Administration, DOT-HS-805-165, July 1979.

138. Texas A&M University letter to National Highway Traffic Safety Administration Concerning Evaluation of NHTSA Audio-Visual Materials. December 1981.

139. Transportation Research Board, Employers' Cost of Motor Vehicle Accidents. National Safety Council, Chicago. Memorandum to Transportation Research Board, August 31, 1979.

140. Transportation Research Board. Highway Safety Research Development and Demonstration: Conference Proceedings. National Highway Traffic Safety Administration, December, 1979.

141. Transportation Research Board, Study of Methods for Increasing Safety Belt Use: Study report. Technical report UR17 prepared for U.S. Congress and U.S. Department of Transportation, Washington, D.C., March 1980.

142. U.S. House of Representatives Committee on Public Works and Transportation; Subcommittee on Investigation and Review, 95th Congress, 2nd Session. Hearings on Safety Belt Usage. January 4-5 and June 6-8; 1978.

143. University of Michigan, Highway Safety Research Institute. Use of Restraint Systems: A review of the Literature. HSRI Research Review, V. 11 (No. 2-3), December 1980.

144. University of North Carolina, Highway Safety Research Center Child Restraint Workshop Series: Volumes I and II DOT-HS-8-02057, 1979.

145. University of Southern California, An Experiment in the Use of Broadcast Media in Highway Safety. NHTSA Contract 010-1-012, December 1971.

145a. Van Dyke, J., The Lifesaving Potential of Greater Safety Belt Usage. National Highway Traffic Safety Administration Mathematical Analysis Division, National Center for Statistics and Analysis, July 1981.

146. Vanderbeek, R.E., Statement Before the U.S. House of Representatives. Subcommittee on Oversight and Investigations, May 7, 1979.

147. Verve Research Corporation. An Examination of the Comfort and Convenience of Safety Belt Systems in 1980 and 1981 Model Vehicles. National Highway Traffic Safety Administration, DOT-HS-805-860, March 1981.

148. Vulcan, A.P, Effects of the Victorian Child Restraint Legislation Road and Safety Authority Victoria, Canada (undated).

149. Waller, P.F., Li, L.K., Campbell, B.J., and Herman, M.L., Safety Belts: the Uncollected Dividends. Highway Safety Research Center, University of North Carolina May 1977.

150. Waller, P., and Barry P., Seat Belts: A Comparison of Observed and Reported Use. Highway Safety Research Center, University of North Carolina. 1969.

151. Ware, A., Pabon, Sims, and Smith, Inc., Motivation of Employers to Encourage Employee Use of Safety Belts. Contract DTNH 22-80-C-07439, in progress.

152. Warner, C.Y., Belt Occupant Restraint Effectiveness. Brigham Young University, Provo, Utah. HS-014-519, Proceedings: Conference of the American Association for Automotive Medicine (17th), Oklahoma City, 14-17 November 1973, pp 491-501.

153. Warner, C.Y., Hunter G.D., Burgett, A.L., and Hoyt, T.A., Effectiveness of Automotive Occupant Restraints. Paper presented at the National Transportation Engineering Meeting, Tulsa, OK., July 1973.

154. Weltman, G., Program Evaluation Results: A Multi-attribute Utility Analysis of Program Suggestions of the Special Committee to Study Methods for Increasing Safety Belt Use. Perceptronics, Inc., Paper prepared for the Special Committee of the Transportation Research Board, October 29, 1979.

155. Westefeld, A., and Phillips, B.M., Laws Requiring Seat Belts. Opinion Research Corp., Princeton, N.J., 08540, DOT-HS-51274, 1976.

156. Westefeld, A., and Phillips, B.M., Safety Belt Interlock System: Usage Survey. Final report. Opinion Research Corporation, Princeton, N.J., DOT-HS-801-594, May 1975.

157. Wilde, G.J.S., and Ackersviller, M.J., Accident Reporting in the Canadian Daily Press. Ministry of Transportation, Ottawa, Canada, April 1978.

158. Wilde, G.J.S., L'Hoste, J., Sheppard, D., and Wind, G., The Use of Mass Communications for the Modification of Road User Behavior. Organization for Economic Co-Operation and Development, Road Research Group, Paris, December 1971.

159. Williams, A.F., and Zador, P., Injuries to Children in Automobiles in Relation to Seating Location and Restraint Use. Insurance Institute for Highway Safety, Washingtion, D.C., 1976.

160. Wilson, W.T., Lonero, L.P., and Ish, D., Increasing Seat Belt Use Through a Program Presented in Elementary Schools." Ontario Ministry of Transportation and Communications. Systems Research Branch, Toronto. In Proceedings of the 16th Conference of the American Association for Automotive Medicine. New York, 1975, pp. 372-387.

161. Wilson, W.T., Lonero, L.P., and Ish, D., The Seat Belt Education Project. Ontario Ministry of Transportation and Communications, Research and Development Division, Toronto. August 1973.

162. Yankelovich, Skelly, and White Inc., A Summary Report of Driver Attitudes Toward Restraints for Greater Safety in the Operation of an Automobile. Motor Vehicle Manufacturers Association. September 1976.

163. Ziegler, P.N., The Effect of Safety Belt Usage Laws Around the World. Journal of Safety Research, Vol. 9, No.2, June 1977.