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USE OF ECONOMIC INCENTIVES TO MODIFY SAFETY BELT USE BEHAVIOR

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ABSTRACT

This research explores the use of modest economic incentives to increase safety belt usage among automobile occupants at a senior high school. Some 1300 students, faculty and staff were presented an educational campaign emphasizing that: (1) even though an accident is a low-probability event for any given trip, the probability that such a mishap will occur during the course of one's lifetime is quite high, and (2) the only way to be protected in the event of this near certainty is to buckle up habitually. Following this educational campaign an incentive program was instigated which gave a modest monetary reward (a coupon redeemable for $5.00 cash) to randomly selected car occupants observed wearing their seat belts. Such an incentive program is based on the learning principle dictating that more frequent, smaller rewards (in this case, cash) are more likely to produce a change in behavior than less frequent albeit greater rewards (here, greater protection in the event of a crash).

Effectiveness of the treatment was measured by monitoring observed belt usage before, during and after the educational campaign and incentive program. Seat belt observations were made on the school grounds as well as in the community at large. Overall results show that the shoulder belt usage rate (in vehicles equipped with shoulder belts) increased from about 21 percent in the baseline phase to 28-39 percent in the educational phase to 46-54 percent in the incentive phase. Usage ranged from 29-40 percent in the follow-up phase. When lap belts as well as the lap/shoulder combination were counted on special observation days, the overall restraint usage rate generally exceeded 80 percent.

EACH YEAR OVER 50,000 Americans are killed in motor vehicle accidents, and another two million suffer disabling injuries. The resulting cost to society has been estimated at over 35 billion dollars (1).

Most of these traffic deaths and injuries are incurred by drivers and passengers of automobiles, the overwhelming majority of whom, for whatever reason, have opted not to make use of available safety equipment. According to the National Highway Traffic Safety Administration, 12,000 lives could have

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been saved in 1979 if safety belts had been worn (2). Research carried out by the UNC Highway Safety Research Center suggests that the actual number of lives saved could be even higher (3). This research, based on over 100,000 drivers involved in N.C. accidents, shows safety belts to be up to 75 percent effective in preventing deaths in motor vehicle crashes, and 50 percent effective in preventing serious injuries. In other words, approximately three out of every four unbelted occupants killed in an automobile accident last year might be alive today if they had been wearing safety belts at the time of the crash.

Most people are aware of the safety benefits derived from belt usage. Opinion surveys have consistently shown that the public has a favorable attitude towards belts and confidence in their ability to protect against injury in the event of a crash (4) (5).

These attitudes, however, have clearly not been translated into effective behaviors. Since safety belts first became mandatory equipment on cars manufactured and sold in the U.S. in 1968, observed usage rates have remained discouragingly low. And despite the advent of more comfortable belt systems and the influx of smaller (and more vulnerable) cars, the trend appears to be downward. Some recent figures on observed belt usage collected from a survey of 19 United States metropolitan areas from November 1977 through November 1979 sets belt usage at just 11 percent overall (6).

Why do people not use safety belts? Reasons often cited include forgetfulness or simply laziness. Other factors are inconvenience and discomfort associated with belt use, the fear of entrapment, and the belief that an accident is always something that happens to "the other person" (7).

The Federal government, led by the National Highway Traffic Safety Administation, has explored a variety of policies and programs aimed at increasing the percentage of persons using belts. These approaches generally fall into the three categories of legislation, engineering and education. Currently at least 20 countries -- including most of the European countries, Australia and four Canadian provinces -- have passed some form of legislation requiring the use of safety belts (8). Mandatory belt use laws, if accompanied by favorable publicity, an educational campaign, plus strong support from enforcement personnel, can be expected to produce a belt usage rate of 65-75 percent (9). However, such legislation has not yet been considered seriously in this country, with the exception of laws directed at specific subpopulations such as infants and young children and perhaps beginning (teen-aged) drivers.

Another way to increase belt usage is to engineer a belt system that prompts usage. This was the approach taken by the Federal government in 1974, when it required cars to be equipped with an ignition interlock system. Congressional action was adverse and the interlock system was short-lived, but other engineering features, such as buzzer-light reminder systems, continue to be required on automobiles. Generally, research has shown that usage rates increase along with the degree of "intrusiveness" of the system; however, the more "intruding" the system the more likely it is to be circumvented (10).

Educational attempts at increasing belt usage have included media campaigns (T.V. spots, pamphlets, news stories,

etc.) as well as special packaged programs developed for different interest groups. While campaigns can modify attitudes towards belts and even increase one's stated intentions of using belts, they have not, by themselves, been shown to have any significant effect on observed usage rates (10) (11) (12).

In response to continued low belt usage rates, Congress in 1978 directed the Secretary of Transportation to conduct a comprehensive study and investigation of methods for increasing safety belt use. This study was subsequently carried out by a committee of the Transportation Research Board (TRB) (2). Recognizing that no single program was likely to have a significant impact, the committee identified four program areas for increasing safety belt use. These are: prescriptive approaches, economic incentive approaches, approaches designed to change public perceptions, and approaches through private sectors.

The findings of the TRB committee assume even greater significance in light of the current administration's recent rescinding of rules that require passive or automatic belt systems in U.S. automobiles. Currently the Federal government is conducting a nationwide campaign to promote the voluntary use of safety belts and child safety seats. As part of this campaign, the NHTSA has funded a number of smaller grants specifically directed at innovative approaches to increasing belt usage. The current demonstration project represents one such effort.

FOCUS OF THIS PROJECT

This project incorporates two of the four areas emphasized in the 1980 TRB report on increasing belt usage: (1) the use of economic incentives to encourage belt wearing, and (2) changing public perceptions about the risk of crashes, about the injury-preventive value of using safety belts, and about the consequences of failing to use them. The goal of the project is to demonstrate how the non-belt-use habit that characterizes some 90 percent of the American public might be modified.

A basic principle of learning is that behaviors that are reinforced will be repeated, while those that are not reinforced will be extinguished. Strength of behavior is heavily influenced by the magnitude of reward and to an even greater degree by the "schedule" of the reward (i.e., smaller, more frequent rewards are more effective for shaping behaviors than less frequent albeit greater rewards). In the case of seat belts, the "normal" reward for usage is greater protection in the event of a crash. While the magnitude of that reward is great, the probability is low indeed when one considers that for a given trip there is only a one in 85,000 likelihood of being seriously injured in a crash (2). And in fact, safe arrival at one's destination, without the inconvenience and delay involved in buckling up, in a sense may reward the non-use of safety belts.

The intervention being tested in the current project is intended to modify this non-use behavior by instigating more immediate and tangible rewards. Specifically, coupons redeemable for five dollars in cash are awarded to occupants in

vehicles who are observed wearing safety belts. The awards are made randomly and at varying locations and times with the goal of cultivating a habit of regular belt use.

The habit is further reinforced by an educational campaign that stresses the lifetime risk of accident involvement. Although the probability of being involved in an accident on any given trip is small, the probability of being involved in such an accident over the course of one's lifetime is actually quite high. Research has shown that, based on an average of 40,000 trips over a 50 year span, the probability of being killed in an accident is one in 100, and the probability of suffering a disabling injury is one in three (13). Since no one knows when an "accident" will happen, the only sure way to protect oneself is to buckle up regularly (i.e., establish a belt use habit).

Thus, the current project attempts to modify belt wearing behavior by means of relatively frequent but small monetary awards coupled with an educational campaign stressing the lifetime risk of accident involvement. This paper reports on testing the concept at Chapel Hill High School (CHHS), where some 1300 students, faculty and staff were eligible for the awards. Even though faculty and staff were participants, the real thrust of the educational effort was toward the students. North Carolina data show that one out of every four to five persons aged 16 to 17 experience a crash sometime within their first year of driving. The high school age group accident rate is five to six times that for adults.

METHODOLOGY

There were five phases to the project, as shown below:

Phase	Date
Baseline	October 15 - January 31, 1982
Monitoring	February 1 - 10, 1982
Education	February 11 - March 14, 1982
Incentive	March 15 - April 9, 1982
Follow-up	April 10 - June 10, 1982

The first phase was to determine the baseline rate for use of occupant restraints. The dependent variable in all phases was the rate of driver shoulder belt use in vehicles equipped with shoulder belts. We concentrated on shoulder belts because observers collected data from a stationary vehicle alongside the road and thus lap belts could not be seen. A later section in this paper will discuss the results of establishing an equivalency factor to reflect the overall restraint use rate (i.e., lap/shoulder and lap belt only).

The baseline observations were made periodically over the course of several months. Even though the stationary data collection vehicle was clearly visible, the observation spots were varied.

In the monitoring phase, we asked the high school principal to announce that shoulder belt usage was being monitored as part of a Federal safety project. Students were also informed that additional observations were being made at other locations within the city. The intent was to determine if the mere presence of observers had an effect on the shoulder belt use

rate. We also felt it would be best to let the monitoring phase follow the baseline phase, so that we could get a better measure of the effect of the education phase, the next to follow.

The education phase began the day that three HSRC senior staff made simultaneous presentations to the CHHS sophomore, junior and senior classes. The presentations lasted about 30 minutes and concentrated on: (1) how lap and shoulder belts are effective -- the role they play in crashes, (2) the fact that motor vehicle crashes constitute the single largest survival threat for this age group, (3) that lap and shoulder belts could save about three out of every four unbelted occupants who die in crashes, and (4) the rules of the incentive phase or "contest" to come. Film clips of instrumented dummies, both belted and unbelted, in 30-35 mile per hour barrier crashes were shown, and each student, faculty or staff member was given a pamphlet that focused on myths regarding safety belts, as well as a flier especially prepared for the CHHS students (which included photographs of several students), and a sheet containing the contest rules for the incentive phase of the project (nicknamed the Belt 'em Tigers Contest). Even though there were approximately 400 people in each session, the groups were very attentive. In fact, several students came forward after the presentations to inquire about where they might obtain belts for their vehicles. This initial educational encounter was supplemented over the next several weeks by cassette tapes played during daily announcements. The tapes featured community role models, including physicians, HSRC staff and University of North Carolina basketball players. The educational phase lasted some five weeks to enable students: (1) to get their belts in good working order, and (2) to form a belt wearing habit before the incentive phase began.

The incentive phase lasted four complete weeks and was designed so participants could win a cash incentive three different ways. In Method 1, observers were stationed on the school grounds. On a random basis, arriving and departing vehicles were waved to a stop and the occupants checked for belt usage (either lap or shoulder belt). Student, faculty or staff belt wearers in that car were given a coupon redeemable at the principal's office for $5.00 in cash.

In Method 2, HSRC staff observed belt use around the Chapel Hill community during non-school hours and days. The observers recorded the vehicle license plate number and whether or not a safety belt could be seen in use. Eligible vehicles were those displaying a Belt 'em Tigers sticker on the front and/or rear bumper. The participants had previously filled out a registration card containing their name and the license plate number of their personal or family vehicle. The strategy here was to promote belt use by all family members, so that a participant could win if another family member (or anyone visible in the vehicle) was belted. Winners of this part of the contest were announced at the school every few days, and prizes were again coupons redeemable for $5.00 in cash. In Methods 1 and 2, a total of 301 coupons was awarded.

Method 3 simply involved a lottery. The names of all persons receiving $5.00 coupons were entered in a drawing, and the prize was a $300 gift certificate. Total prizes were $1800 for the 1300 student, faculty and staff members.

The final project phase was the follow-up, where data were collected to determine the persistence of any belt wearing effect. During this phase no reminder messages were used as reinforcement.

RESULTS

Figure 1 shows the shoulder belt usage rate across all five phases of the project. The usage rate was around 21 percent in both the baseline and monitoring phases. During the education phase, the usage rate ranged from 28-39 percent. The incentive phase showed a further increase to around 46-54 percent. (The two extraneous data points at the end of this phase represent another intervention whereby $100 was offered towards the junior-senior prom if the wearing rate exceeded 60 percent for two days.) Finally, the follow-up period showed a modest decay in the belt wearing rate in the range of 29-40 percent. The overall follow-up rate (36 percent) was actually higher than the rate achieved in the educational phase (32 percent). These percentages are based on over 10,000 observations during all phases combined.

Figure 2 presents the same data broken down by age of the driver. For ease in plotting, the observations in the baseline and monitoring phases are reduced to a single value. Although adults showed a higher use rate in the baseline and monitoring phases, the students overtook the adults during the education and incentive phases. Here it should be noted that adults include not only CHHS faculty and staff but also parents driving children to school. Interestingly, the adults reached about a 40 percent use rate during the fourth week of the educational campaign but failed to go much beyond this level during the incentive phase. On the other hand, the students were consistently around 55 percent during the incentive phase. The age differences were less apparent in the follow-up phase, although the student usage rate increased somewhat during the last two weeks.

Sex differences for all participants are examined in Figure 3, and it is apparent that the shifts seen for each phase are equally distributed between males and females. The males showed a higher gain during the first part of the education phase, but this effect was short-lived. The male and female usage rates were identical during the first week of the incentive phase, but the females held a slight edge thereafter.

The same type result is shown in Figure 4, which is a graph of students only. Female students had a higher usage rate than their male counterparts during every week of the incentive phase and nearly all of the follow-up weeks.

Figures 5 and 6 examine race differences for all participants and students, respectively. The shoulder belt usage rate for white participants is roughly twice that shown for non-whites in every phase. The lone exceptions occur during the second week of the educational phase and the early part of the follow-up. Figure 6 shows that these non-white gains were attributable to students.

Figure 7 is a graph of use rate for student drivers of vehicles with and without other occupants. From the first week of the education phase until virtually the end of the contest,

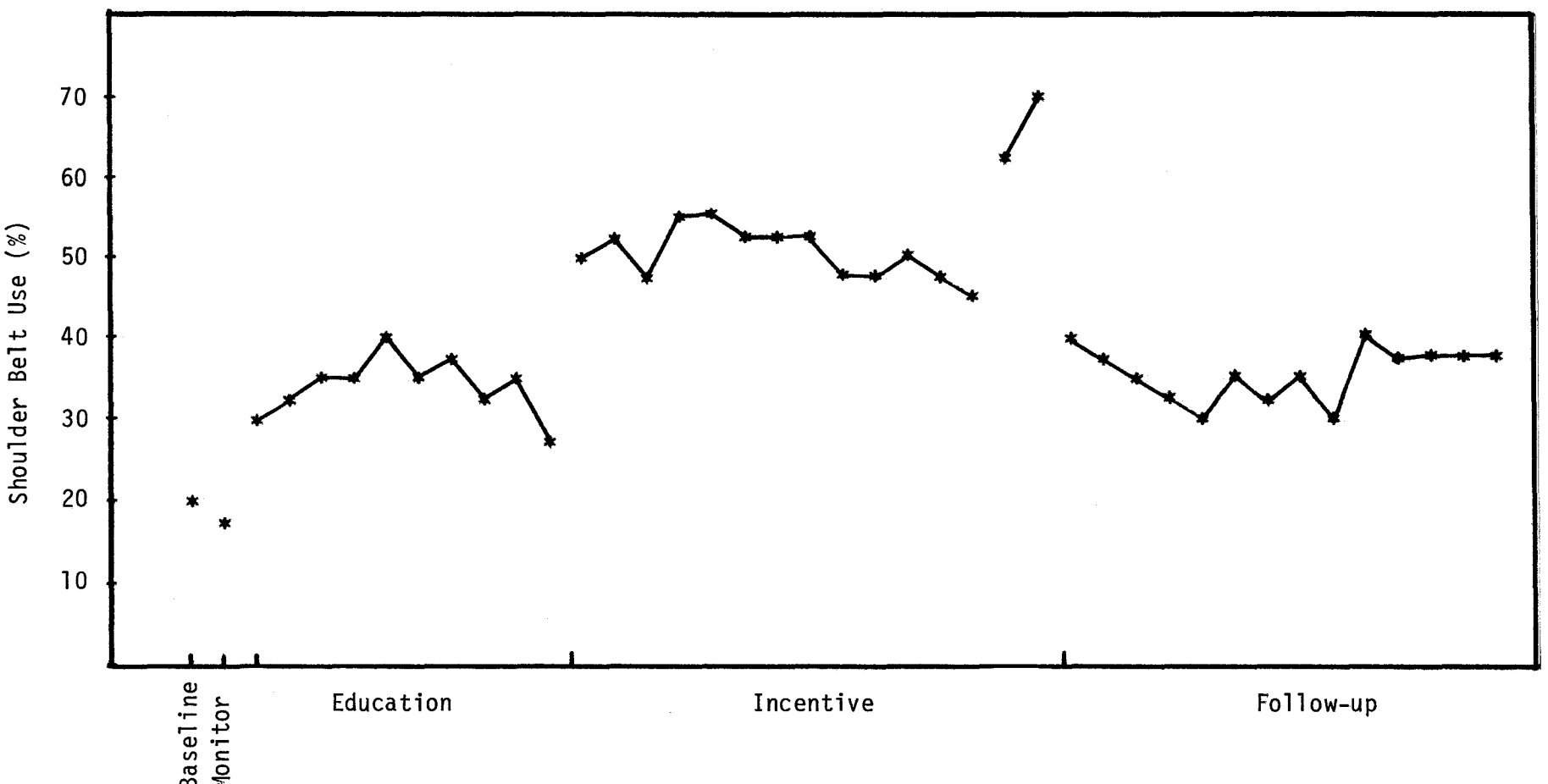

Fig. 1 - Variation in driver shoulder belt use rate by phase.

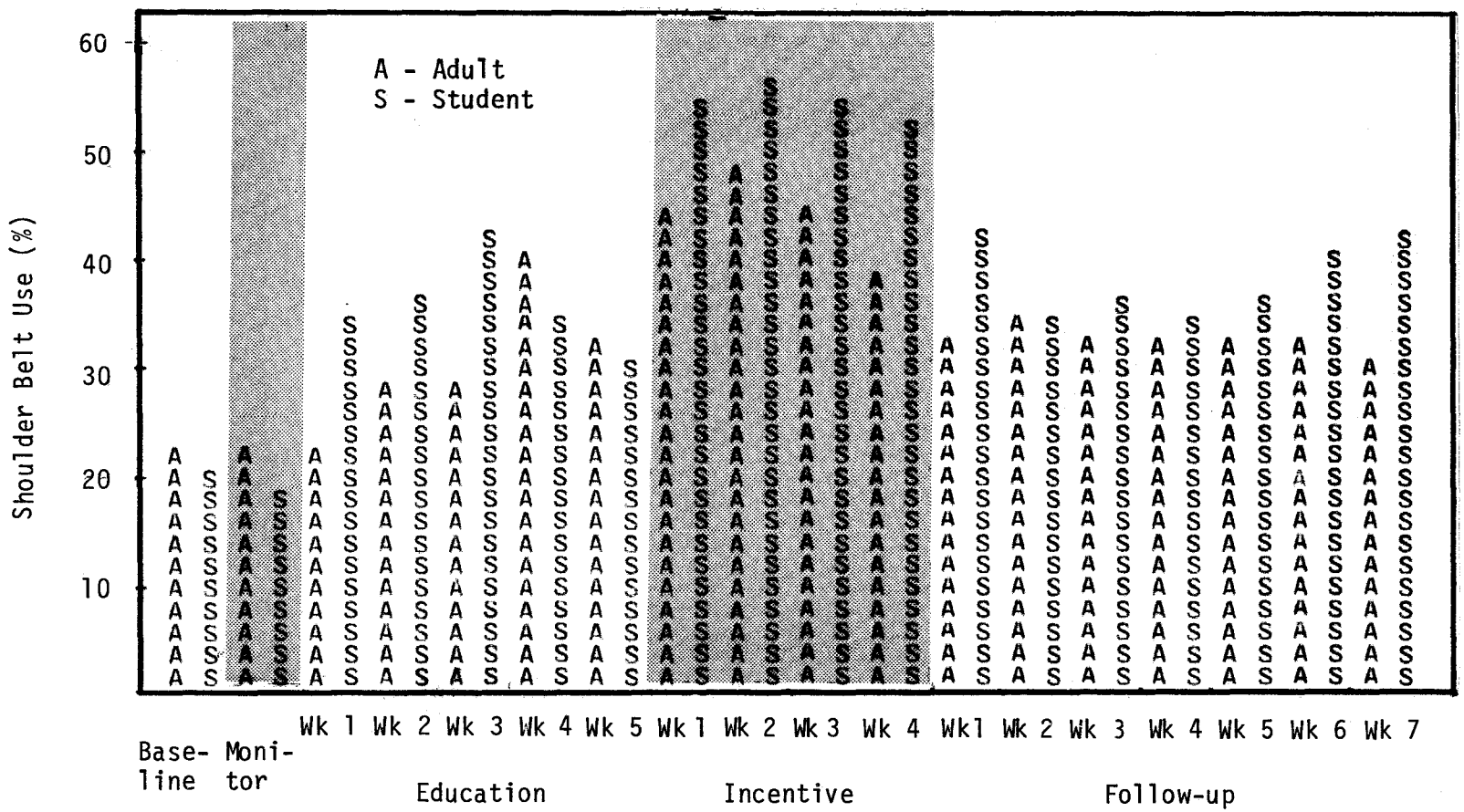

Fig. 2 - Driver shoulder belt use rate by age.

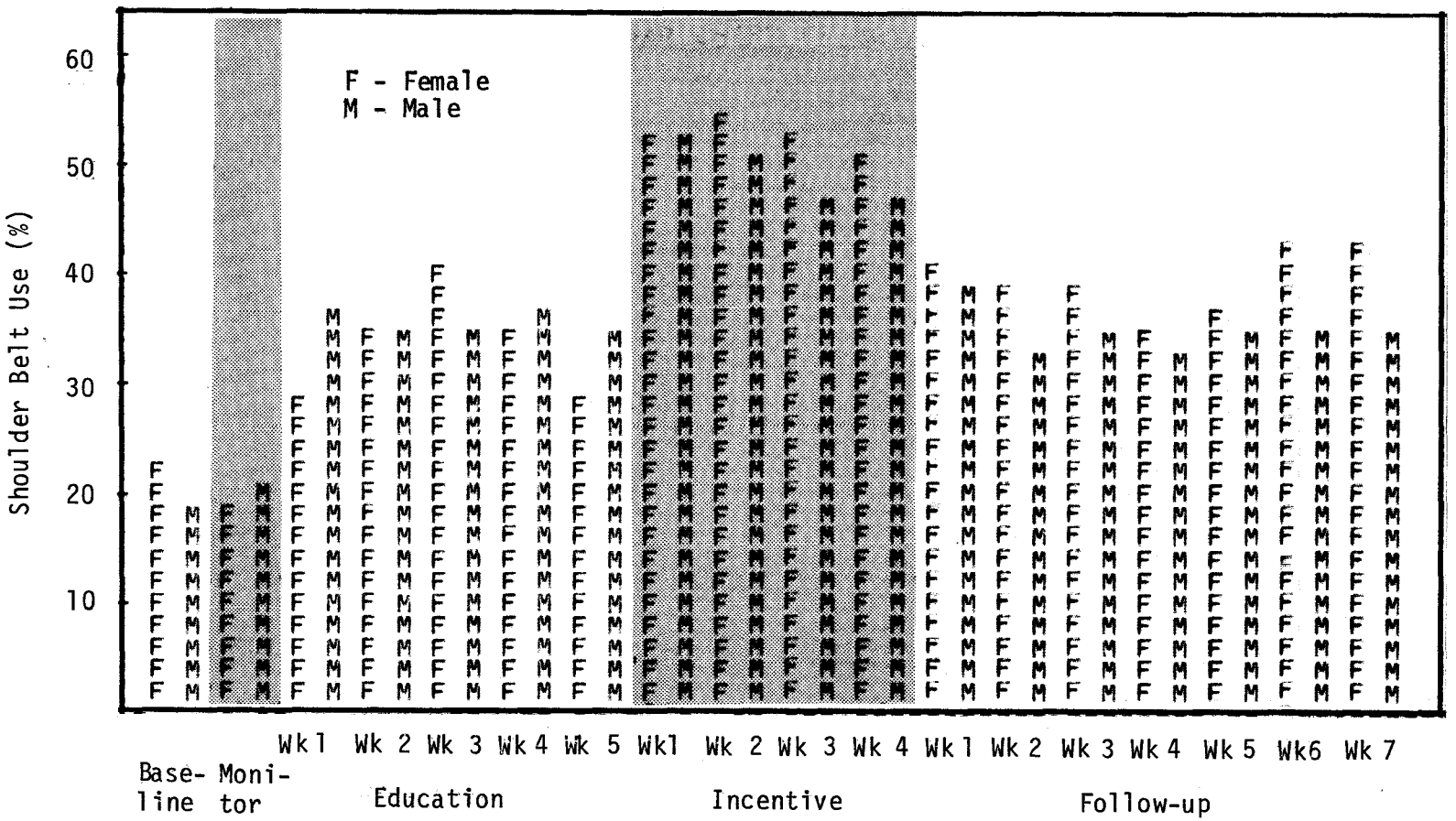

Fig. 3 - Driver shoulder belt use rate by sex.

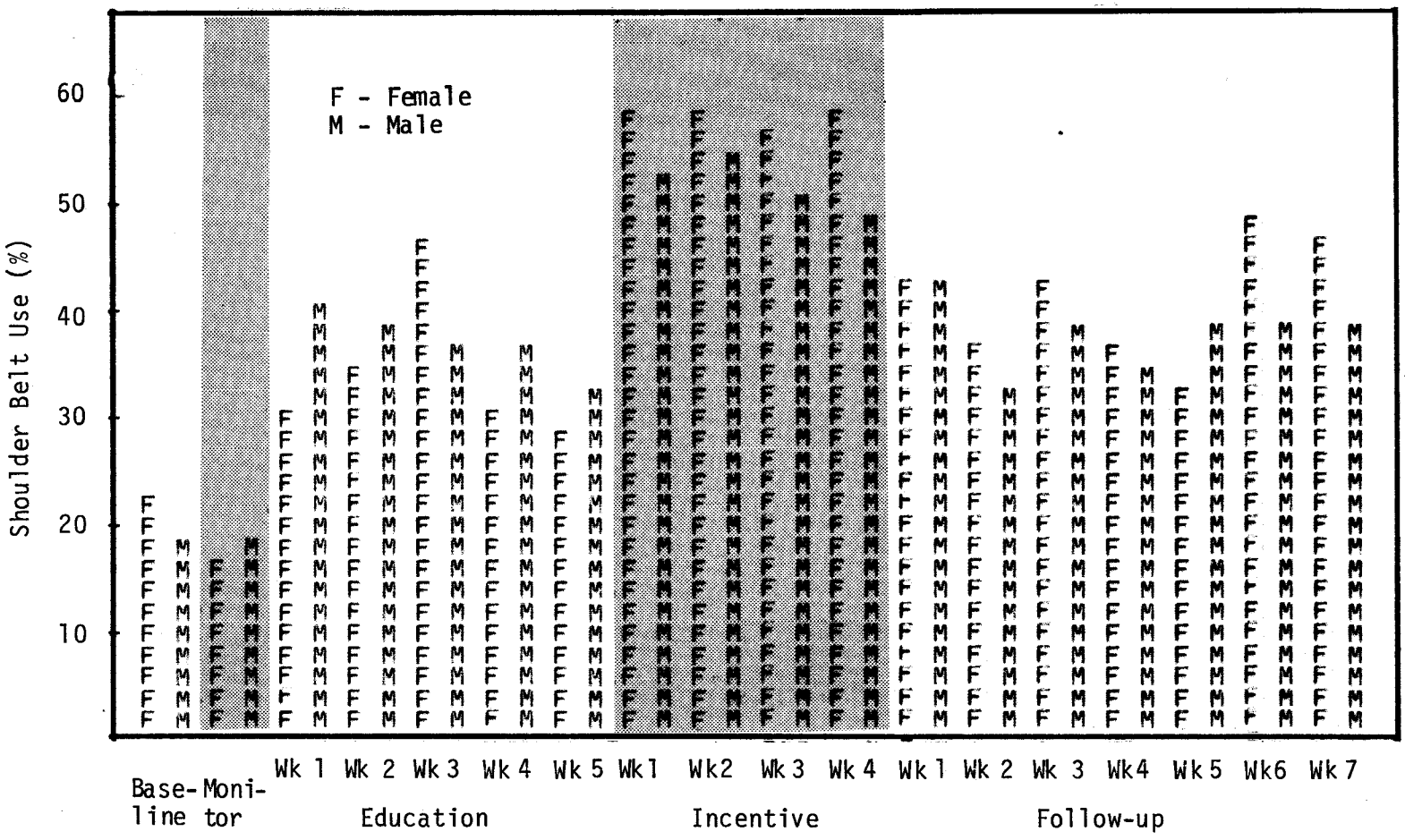

Fig. 4 - Driver shoulder belt use rate by sex--students only.

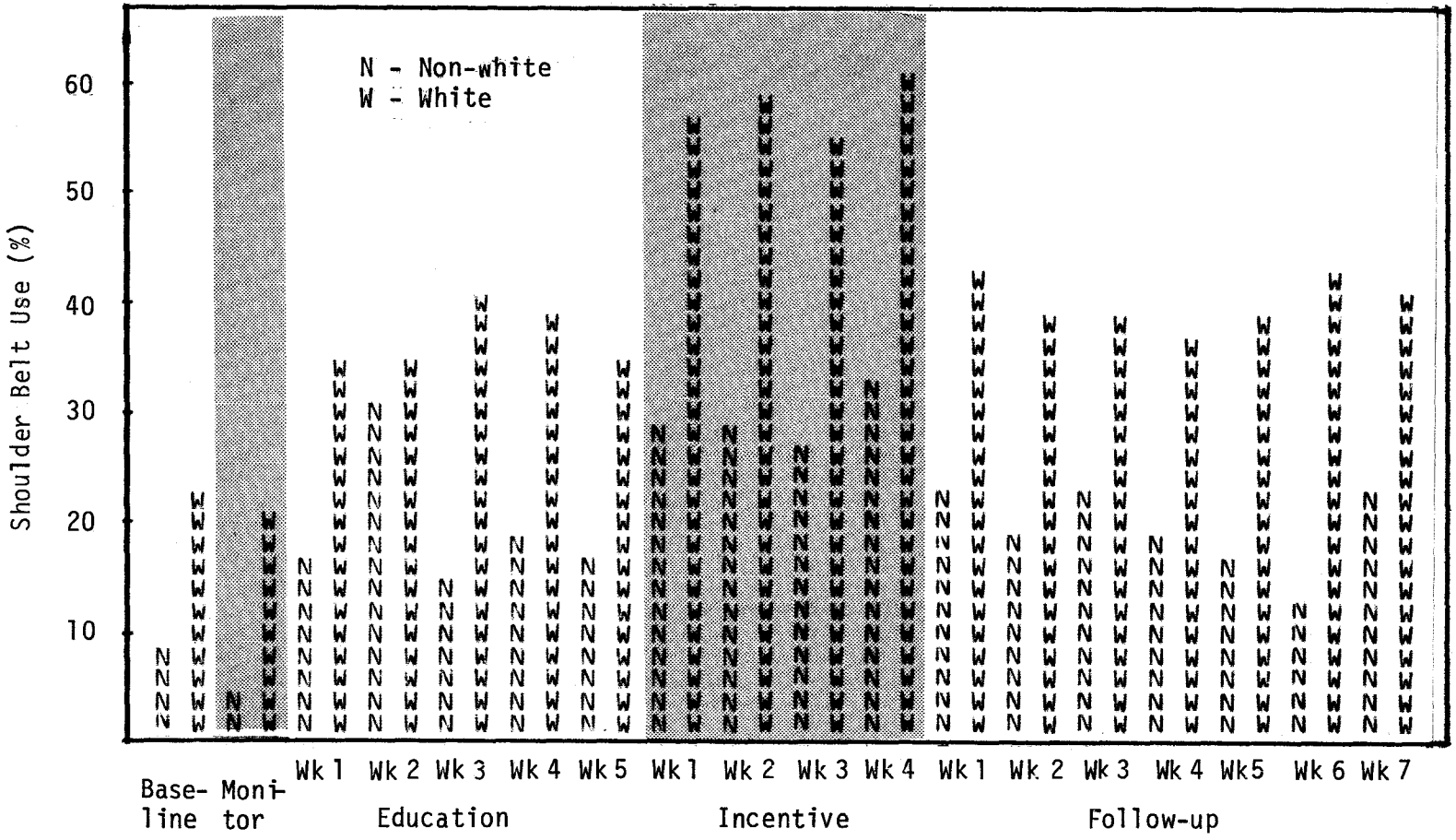

Fig. 5 - Driver shoulder belt use rate by race.

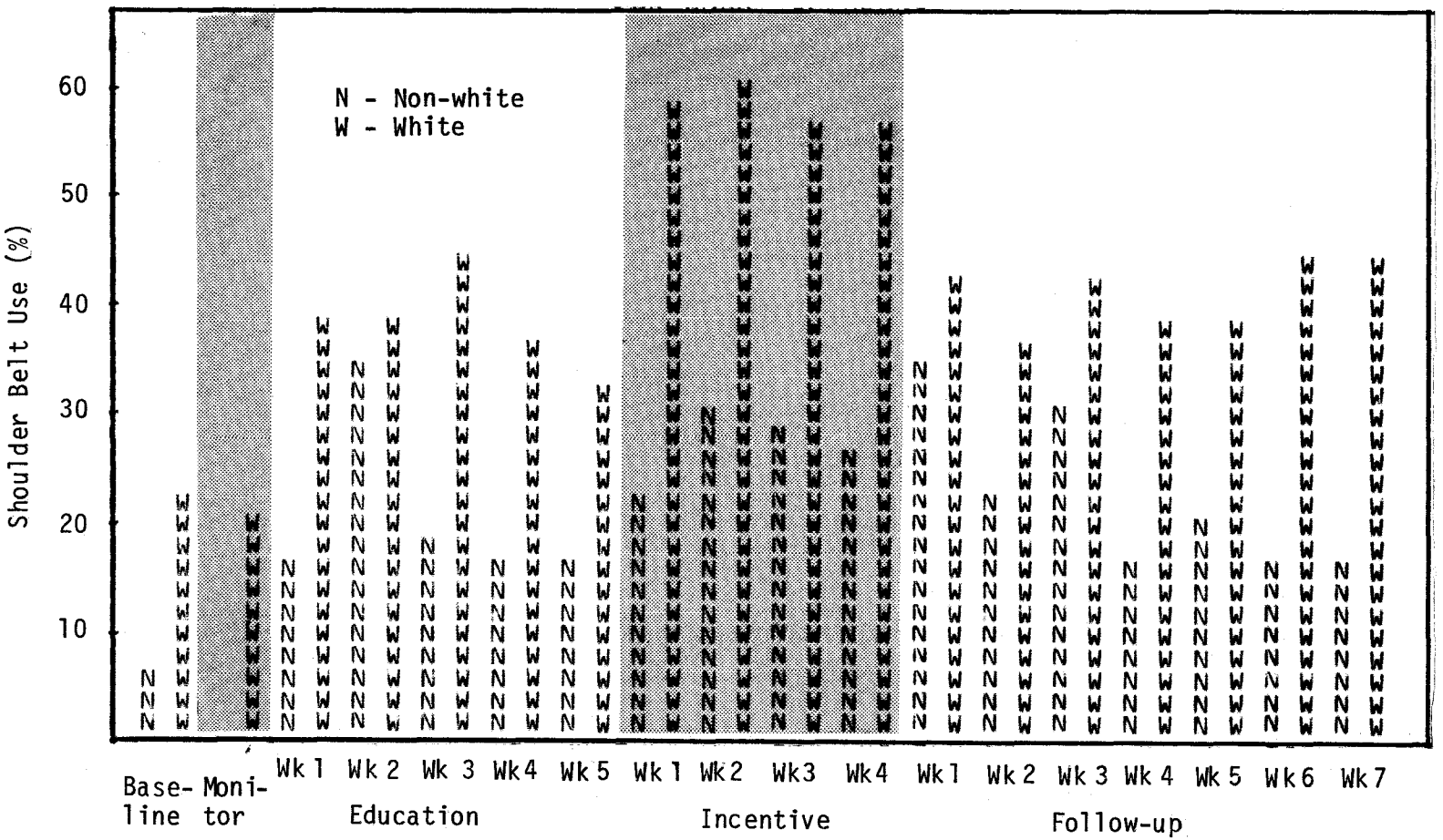

Fig. 6 - Driver shoulder belt use rate by race -- students only.

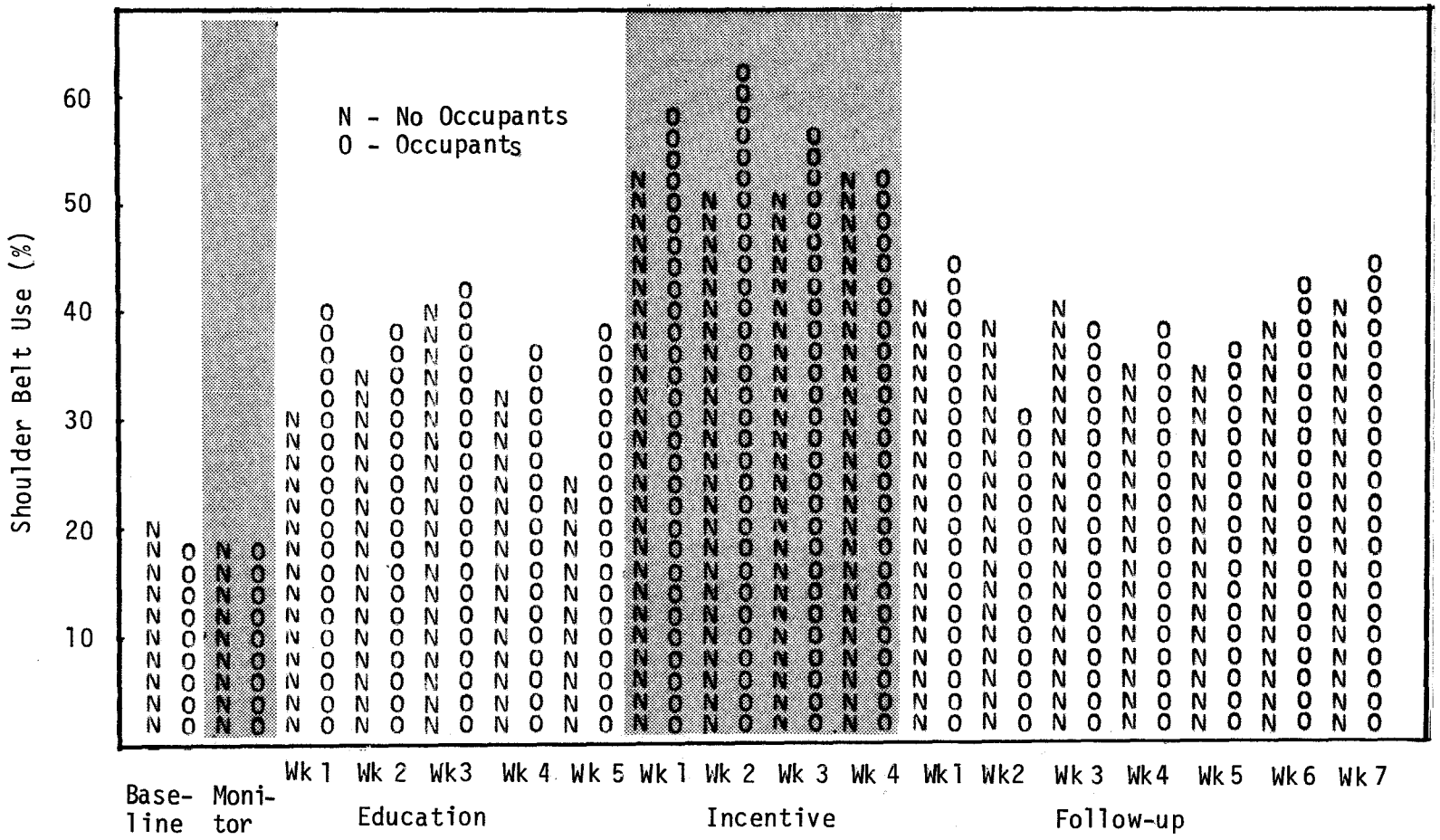

Fig. 7 - Driver shoulder belt use rate by presence of other occupants -- students only.

the drivers of vehicles that contain other occupants show a higher use rate. Perhaps this should be expected, given that occupants have a chance to remind each other to use their belts. The literature also contains many studies that show an influence effect among occupants, although this particular figure addresses this point indirectly.

DISCUSSION

The data presented in the results section follow the line of a successful safety belt incentive campaign, where the safety belt usage rate shows a positive progression from baseline to the education phase and then to the incentive phase. The expected decay in the follow-up phase was modest, as the belt use rate resembled the rate obtained during the education phase. The follow-up rate is also about 75 percent higher than the rates recorded in the baseline and monitoring phases. In this case, it appears that the five weeks of the education phase (which contained a "contest anticipation" mood) coupled with the four weeks of the incentive phase were long enough to produce some habitual safety belt wearing tendencies.

Another point should be made about the magnitude of the percentages presented here. These are driver shoulder belt percentages in vehicles equipped with shoulder belts and thus do not account for drivers restrained only with a lap belt. Some effort was undertaken to establish this equivalency factor (i.e., "x" shoulder belt percentage relates to "y" lap and lap/shoulder percentage combined). The method simply involved one or two observers periodically standing near parking lot exits during several days of the incentive phase and recording whether the driver was restrained by either of the above methods -- that is, lap belt only or lap/shoulder combination. Vehicles without shoulder belts were deleted just as they would be for the normal data collection activity from the stationary vehicle. This technique consistently produced an equivalency factor of about 1.2. In other words, multiplying the shoulder belt percentage by 1.2 would yield the overall restraint use rate. Applying this factor to the usage rates shown during the first four phases results in the following:

Phase	Shoulder Belt Use Rate	Overall Restraint Use Rate
Baseline	21%	25%
Monitoring	21%	25%
Education	28-39%	34-47%
Incentive	46-54%	55-65%
Follow-up	29-40%	35-48%

Thus, roughly two-thirds of the drivers were typically restrained during the incentive phase, nearly a three-fold increase over the before phase. It should also be noted that 80+ percent overall restraint use was frequently seen during the few days of this special data collection activity.

A final discussion point concerns the 2:1 disparity in the white-nonwhite usage rates. For whatever reasons, the nonwhite group did not show much of an increase in their belt wearing

activity. The reasons may be tied to socio-economic differences and perhaps this group's approach to health care in general, but the results are disappointing. Some small group focus meetings will be used to explore the reasons behind this low rate.

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