Automobile Seat Belts: Usage Patterns in Automatic Belt Systems

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Since the passage of mandatory passive restraint legislation (Federal Motor Vehicle Safety Standard 208) in 1984, numerous investigators have examined patterns of use among the different types of restraint systems and user populations. In this paper, we review the available data on usage patterns in automatic shoulder belt and manual lap belt systems. The restraint systems involving automatic shoulder belts have generally been regarded as highly successful in increasing the use rates of shoulder belts for American drivers (frequently greater than 90%). At the same time, the use of the manual lap belt with automatic shoulder belts remains roughly similar to the use rate for manual three-point systems. We also review studies of driver's knowledge about the existence and importance of the elements of these automatic systems. These findings have potential application for the design of manual and automatic restraint systems in automobiles.

INTRODUCTION

The use of manual (i.e., active) restraint systems (or seat belts) in cars has increased dramatically over the last several decades, changing from around 10% in the late 1970s to as much as 68% in the 1990s (Datta & Guzek, 1992; National Highway Traffic Safety Administration [NHTSA], 1996b). Several factors are responsible for this increase. One important determinant has been the passage of mandatory use laws (MULs), which have been shown to increase use rates by roughly 2.5 times when applied and enforced vigorously (Bunch, Hatfield, Hinshaw, & Womack, 1986; Reinfurt, Campbell, Stewart, & Stutts, 1988, 1990; Ulmer, Preusser, Preusser, & Cosgrove, 1995). Another factor has been the development of so-called automatic seat belt systems that satisfy Federal Motor Vehicle Safety Standard 208. This law requires that all vehicles sold after 1991 in the United States must have passive occupant restraint systems – either automatic shoulder belts or airbags – for the front outboard passengers. To meet this standard with belt systems, manufacturers have designed a surprising array of two-, three-, and four-point restraint systems, for which the number of points refers to the number of attachments of the belt to the vehicle (see Padmanaban, Lange, Ray, Curzon, & Cooperrider, 1991, for a description). In one of these systems (the subject of this paper), which has been adopted by several automakers, an automatic (motorized or nonmotorized) shoulder belt is combined with a manual lap belt.

Systems with automatic shoulder belts have been responsible for a dramatic increase in the use of shoulder belts; estimates of use rates have increased from roughly 45% to 50% for manual shoulder belts to 97% for the nondetachable motorized shoulder belts (Reinfurt, St. Cyr, & Hunter, 1990; Streff & Molnar, 1991). Recently, however, there has been concern that these seat belt designs might actually decrease the tendency for drivers and front-seat occupants to use the manual lap belt.
(e.g., Coben, 1991; Lovvoll, Laughery, Wogalter, & Terry, 1994; Reinfurt, St. Cyr, et al., 1990).

Various accident injury modes have been found to be associated with the failure to connect the lap belt when the shoulder belt is attached, such as ejections (Williams, Wells, Lund, & Teed, 1989) and “submarining” (sliding under the belt; Alsever, 1968; Snyder, Crosby, Snow, Young, & Hanson, 1967). One concern has been that the automatic shoulder belts might actually contribute in some way to the drivers’ failure to connect the lap belt. In this paper, after reviewing the work on use rates with three-point manual belts, we will turn to the concern of lap belt usage.

**USE RATES OF THREE-POINT MANUAL BELTS**

In this section, we present estimates of the manual three-point belt use from various studies to provide a background for the analyses of automatic systems. A variety of estimates of manual three-point use rates is available. These values vary considerably depending on the location studied, whether or not a MUL was in force, when the survey was done, the type of vehicle, and a host of other factors. Probably the most thorough data sets on this issue are the “19 cities reports” funded by NHTSA and based on several years of study of seat belt use in a variety of U.S. locations (e.g., Bowman & Rounds, 1988, 1989; Datta & Guzek, 1990, 1992; Goryl & Bowman, 1987). From 1986 through 1991, belt use in almost 750,000 vehicles was studied.

The measures reported in these studies are chiefly the use rates of the shoulder belt; the use of the automatic systems has not been of major concern. For our purposes in evaluating the three-point manual use rate, there is a problem in that these counts of shoulder belt use include vehicles with three-point manual belts and vehicles with automatic shoulder belts. Only a small percentage (14% in 1991) of vehicles had the latter system. Hence the measures of shoulder belt use provided by the overall results of the 19 cities reports almost certainly overestimate the use rate of the manual three-point belt per se, because, as we will show later, the use rate with automatic shoulder belts is frequently greater than 90% (it was 80.1% in Datta & Guzek, 1992).

The overall rates across the various cities used in the studies vary widely, from 28.1% (Providence, Rhode Island) to 70.6% (Dallas, Texas). The overall rate averaged across cities was 51.1%. This rate has increased steadily recently, up from about 42% in 1987 to about 68% in 1995 (NHTSA, 1996b). Assuming (as we will show later) that the use rate of the automatic shoulder belt is 90% (14% of the belts are automatic), the estimate of the three-point manual belt use rate based on shoulder belt use per se is approximately 6% too high. Thus, from the 19-cities projects in 1991, an adjusted estimate for the three-point manual use rate is 45% (51% minus 6%). Based on the 1995 data, the adjusted rate of three-point belt use would be roughly 62% (68% minus 6%).

Other studies have provided estimates of the three-point manual use rate as well, although the sample sizes and sampling procedures were not as extensive as those in the NHTSA studies. For example, in an early study Williams, Wells, & Lund (1987) reported that the use of shoulder belts was about 50% in four states (New York, New Jersey, Illinois, and Texas). We calculated from those Williams et al. data that shoulder belt use in the manual three-point system in 1987 was 61%. (This excludes the automatic three-point belt system in General Motors vehicles and the system in some Volkswagens that have only shoulder belts.) Williams, Wells, Lund, and Teed (1992) reported that manual three-point shoulder-belt use was 65% in 1989 for cars without airbags and 66% for cars with airbags. Streff, Molnar, and Christoff (1993) found that the three-point manual belt use rate in Michigan was 49.7% in cars without airbags and 61.6% in cars with airbags; in 1994 and 1995, the rates were 66.1% and 66.8%, respectively, averaged over airbag and nonairbag vehicles (Eby, Streff, & Christoff, 1994, 1995).

Interestingly, Williams, Wells, & Lund (1990) found the use rate with the nonmotorized detachable three-point automatic design
used by General Motors to be 66%. In a parking lot survey, Williams et al. (1987) found that almost all of these belt systems were disconnected (both shoulder and lap portion) when the car was parked. Similarly, Streff and Molnar (1991) found that only 1.4% of these detachable belt systems were connected in parked cars in the Michigan studies. Apparently, occupants use this system as if it were an active manual three-point restraint; they buckle it manually when entering the car, and they tend not to use it as an automatic system. Consistent with this finding, the use rate for this system (about 66%) is within the range of use rates for the (active) manual three-point system used in other vehicles.

In addition, several studies of self-reported belt use data are available. Streff and Wagenaar’s (1989) study, which also summarized several other studies in which the self-reported rate was given, found that the three-point manual belt use ranged from 26.6% to 66.9%; these data appeared to depend strongly on whether or not a MUL was in force, and we find it difficult to generalize about them. Lovvoll et al. (1994) found that the self-reported use of three-point manual belts was 90%. These values, after being decreased by the 12% that Streff and Wagenaar (1989) suggested, indicate that estimates of manual three-point belt use fall generally within the ranges found with direct observational methods.

**Lap Belt Use Patterns in North Carolina**

The Highway Safety Research Center (HSRC) has studied several facets of safety belt use in North Carolina. The HSRC studies were conducted in several phases from 1985 to 1991; these various data sets are described in Reinfurt, St. Cyr, et al. (1990; see also Hunter, Reinfurt, Stutts, St. Cyr, & Hall, 1989; Reinfurt, Stewart, Weaver, & Green, 1991). The methods used to observe the belt use of drivers are described by Reinfurt et al. (1988). Pairs of observers collected data at intersections at 72 locations in the state during peak commuting hours, noncommuting hours, and the weekend. The sites “were normally at intersections where vehicles were forced to come to a stop” (Reinfurt et al., 1988, p. 9). Observers were positioned to view the front-seat occupants for lap belt use. When there was uncertainty about the lap belt usage, the observers attempted to engage in conversation with occupants in an effort to confirm their judgment. One of the observers recorded age, race, gender, belt type, use of lap belt, use of shoulder belt, and misuse of shoulder belt (e.g., behind back), if any, for the driver and the front-seat passenger (when present).

The results for studies with sufficient sample sizes vary slightly depending on the particular study. In cars with automatic shoulder belts and manual lap belts (see Table 1), the rate of shoulder belt use varied from 75% (Hunter et al., 1989) to 94.2% (Reinfurt, St. Cyr, et al., 1990). An overall estimate across three studies shows a use rate of 92.2%. However, whereas the shoulder belts were used at a very high rate, the estimates of manual lap belt use ranged from only 28.6% to 37.2% (Reinfurt et al., 1991), with an across-studies estimate of 32.3%. The rate of belt use in the vehicles with three-point manual belts was 71% (Table 1). This investigation has raised suspicions that the automatic shoulder belt might be interfering in some way with use of the manual lap belt.

**Belt-Use Rates in Michigan**

To measure the compliance with Michigan’s mandatory safety belt law, the University of Michigan Transportation Research Institute conducted a series of observational surveys to
determine the belt use rate among vehicles throughout the state. Baseline data and methods were established by Wagenaar and Wiviott (1985) prior to the passage of the MUL. In these studies, lap belt use rates in vehicles with automatic shoulder belts were provided as part of their overall analyses. The observations were made at 240 sites located throughout the state that were generally limited to intersections but also included 50 freeway exits. The data were collected at 1-h intervals from 8:00 a.m. to 6:00 p.m. All vehicles had to be motionless for at least several seconds for an observation to be completed.

The observations were made by two-person teams with one person focusing solely on the occupants. Observers underwent extensive training over a three-day period prior to data collection; all observations were conducted under supervision of the project director or field supervisor, who made unannounced visits to ensure accurate data collection procedures. Interobserver reliability exceeded 90% before field observations began. Data were collected at 1-h intervals from 8:00 a.m. to 6:00 p.m. All vehicles had to be motionless for at least several seconds for an observation to be completed.

The IIHS Studies

In a series of observations, the Insurance Institute for Highway Safety (IIHS) examined shoulder and lap belt use in four different areas across the U.S. (Williams et al., 1987). Data were collected in Chicago, Los Angeles, Philadelphia, and the Maryland and Virginia suburbs of Washington, D.C. Only specific vehicles with automatic restraint systems (Ford, Toyota, Nissan, GM, Volkswagen, and Chrysler) were evaluated; these consisted of cars with a model year of 1986 and 1987, with some 1985 GM cars. In the Williams et al. 1987 study, some cities were not under the MUL; however, in the follow-up study in 1989, each area required the use of shoulder belts.

Observations were limited to suburban intersections and were taken during rush hour traffic. Data were collected by observers stationed on the side opposite the driver in order to survey shoulder and lap belt use as the car “slowed or stopped at intersections” (Williams et al., 1992, p. 184). The second part of the study included the evaluation of restraint systems in cars parked in parking lots. Another aspect of the IIHS research evaluated the lap belt use rates in cars involved in accidents (IIHS, 1992).

Table 1: Comparison of Three-Point Manual Belt Use with Lap Belt Use in Automatic-Shoulder/Manual-Lap Belt Systems.

<table>
<thead>
<tr>
<th>Source</th>
<th>3-Point Manual</th>
<th>Lap Belt</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Number Attached (%)</td>
<td>Total Observed</td>
</tr>
<tr>
<td>North Carolina (HSRC)</td>
<td>971 (71%)</td>
<td>1367</td>
</tr>
<tr>
<td>Michigan (1990)</td>
<td>4853 (51%)</td>
<td>9507</td>
</tr>
<tr>
<td>Michigan (1992)</td>
<td>5264 (48%)</td>
<td>10877</td>
</tr>
<tr>
<td>IIHS Studies</td>
<td>1760 (60%)</td>
<td>2937</td>
</tr>
<tr>
<td>Totals (% attached)</td>
<td>12848 (52.0)</td>
<td>24688</td>
</tr>
</tbody>
</table>

Note: The studies by Lehto (1994, 1995) are not included in this analysis because the two rates were not measured in the same investigation.
In the 1987 study, use of the automatic shoulder belts varied among the several designs, ranging from 92% for the nondetachable motorized design to 66% for the detachable nonmotorized three-point design. The manual lap belt use rates for cars with automatic restraints in primarily MUL cities ranged from 32% to 65%, and the general finding was that “about half the drivers in cars with automatic two-point belts and separate manual lap belts were using the lap belts” (Williams et al., 1992, p. 187). In our comparisons, we excluded data from GM vehicles (with three-point automatic systems) and from Volkswagen vehicles (some of which did not have lap belts). The data from the remainder of the vehicles in this survey are in Table 1. The manual lap belt in vehicles with automatic shoulder belts was found to be used 43% of the time. In contrast, the manual three-point belts were found attached 60% of the time. The analysis of lap belt use for individuals involved in automobile crashes in Virginia showed a 66% use of lap belts in cars with automatic shoulder belts.

Other Studies of Manual Lap Belts

Recently, Lehto (1994, 1995; see Lehto & James, 1997) observed drivers of vehicles with motorized automatic shoulder belts in two separate studies in Indiana and Arizona and evaluated the rate of lap belt use with this system. Data were collected in various parking lots (and one rental car agency) in Indiana in 1994 and at shopping malls in Arizona in 1995. In Indiana, 93.9% of the drivers (92% of the right-front passengers) with this system had the shoulder belt attached. The lap belt use rate with this system was 61.3%; 67.2% of the right-front passengers used the lap belt. In Arizona, 88.1% of drivers were using their shoulder belts (87.1% of passengers) and 68.7% of these drivers were wearing the manual lap belt (72.6% of passengers).

Although Lehto did not evaluate the manual three-point use rate directly, estimates of the overall shoulder belt use rates (which pool automatic and manual belt systems) in Indiana and Arizona for the same general time are provided by NHTSA (1996a, 1996b). Taken cautiously (because the sampling teams and locations are not the same as Lehto’s), these values can perhaps be used as additional evidence about the comparison between lap belts in automatic systems and those in manual three-point systems. For Indiana in 1994, the three-point use rate was 56% (NHTSA, 1996a), whereas that for Arizona in 1995 was 60% (NHTSA, 1996b). For comparison, Lehto’s (1994, 1995) values on the use of the lap belt in systems with automatic shoulder belts for the same years and states (61% and 69%, respectively) are greater than the corresponding three-point manual rates that he found.

**EFFECT OF AUTOMATIC SHOULDER BELT ON LAP BELT USE**

In this section we examine the possibility, raised in view of several results already presented, that the automatic shoulder belt might in some way inhibit use of the manual lap belt. Various mechanisms have been proposed to explain why an automatic shoulder belt might have this effect. First, it has been hypothesized that people forget to attach the manual lap belt (Lovvoll et al., 1994) or that a passive shoulder belt system might even induce forgetting to buckle the lap belt. According to this latter argument, the involuntary fastening of the shoulder belt over drivers might give them the impression of being fully restrained. The sensory processes associated with seeing and feeling the automatic shoulder belt in action might, in effect, block other processes that would normally lead to buckling the lap belt. Psychologically, this represents a kind of induced forgetting. In contrast, the processes involved in buckling three-point systems would be intact, as they are uninfluenced by an automatic shoulder belt. A related idea is that the automatic fastening of the shoulder belt provides a false sense of security, thus reducing motivation to actively buckle the manual lap belt (Reinfurt, St. Cyr, et al., 1990).

Second, it has been proposed that drivers in cars with automatic shoulder belts (whether motorized or nonmotorized) do not understand the automatic belt system and do not know either that the lap belt is present or that it is important to connect it.
In light of these suspicions about lap belts, we examined evidence concerning the use of manual lap belts in vehicles with various kinds of automatic shoulder belts (motorized and nonmotorized). As a way to test the hypothesis that the automatic shoulder belt interferes in some way with the propensity to attach the manual lap belt, we compared manual lap belt use rate with that for manual three-point belts; the latter has been studied extensively. As can be seen in Table 2, our rationale is that if the lap portion is to be fastened, the driver must do it manually (i.e., actively) with both the automatic shoulder belt system and the completely manual three-point system. Both systems also require exactly one intentional action on the part of the occupant for the lap portion to be connected. The major difference between the designs, therefore, is the presence or absence of the automatic shoulder belt. Therefore, if the automatic shoulder belt acts in some way to inhibit the buckling of the lap belt, then one would predict that the belt use rate for the automatic systems should be less than that for the manual three-point system.

**Lap Belt versus Three-Point Use Rates**

The data in Table 1, viewed across the four major studies of belt use, show wide variation in the use rates of the manual lap belt versus the manual three-point belts; the effects are essentially opposite for certain cases. At the risk of oversimplifying these differences, we pooled the data from the various studies in an attempt to stabilize these variations somewhat. The pooled values show that the three-point manual belt was worn about 52% of the time, whereas the manual lap belt in systems with automatic shoulder belts was worn about 48% of the time (Table 1). When we computed \( \chi^2 \) for each of these differences in each of the four studies separately, all were highly significant (all \( p < .01 \)).

The overall result is that we have four studies with effects that are highly significant but that differ considerably in both direction and magnitude. This range of values for both of these rates probably depends strongly on the year and geographical location where the data were taken, the type of vehicles, driver demographics (Lund, 1986; Reinfurt, Campbell, et al., 1990; Reinfurt, Williams, Wells, & Rodgman, 1996), and so on. Even though each of these differences is reliable, these findings – especially considering the across-studies variations in this effect – do not provide convincing evidence that the lap belt in automatic systems is worn systematically less frequently than in the three-point manual system.

**Some Methodological Considerations**

We are not completely comfortable with this pooling procedure because it combines data with different sample sizes from different locations, different years, and so on. More importantly, it combines data using slightly different data-collection methods, which might influence the measured use rates of various subparts of the belt systems, as discussed in the following.

Two concerns are the degree of training of the data gatherers and the methods by which the data were obtained at the observation locations. In the HSRC study and to some extent in the IIHS study, the observer might have had too much to do during the brief observation period to accurately record all of the data that were sought. For example, although two observers were used in the HSRC studies, a single individual was responsible for collecting data on the age, race, gender, belt type, use of lap belt, use of shoulder belt, and any misuse (behind back, etc.) of the shoulder belt of one (and sometimes two) front-seat occupants. In addition, the observations were not always made in situations in which the vehicle was

<table>
<thead>
<tr>
<th>Condition</th>
<th>Actively Buckle Lap Belt?</th>
<th>Number of Actions?</th>
<th>Actively Buckle Shoulder Belt?</th>
</tr>
</thead>
<tbody>
<tr>
<td>Manual 3-point system</td>
<td>Yes</td>
<td>One</td>
<td>Yes</td>
</tr>
<tr>
<td>Automatic shoulder, manual lap</td>
<td>Yes</td>
<td>One</td>
<td>No</td>
</tr>
</tbody>
</table>
stopped completely (Hunter et al., 1989; Reinfurt et al., 1988, p. 9). These demands make it unlikely, in our view (also F. M. Streff, personal communication, October 1995), that all of this information could be recorded accurately. For example, detecting whether or not the manual lap belt is connected is relatively difficult, given its location in the car. If it was not detected on various occasions, this could have reduced the reported use rate in these studies. Also, there was no distinct coding category for the shoulder belt being attached without the lap belt; this category was coded as “unknown.” The specific methods concerning these issues are less clearly described in the IIHS studies, but similar concerns are at least possible there as well.

Such a bias does not seem to be present in the Michigan studies or in the Indiana-Arizona studies (Lehto, 1994, 1995; Lehto & James, 1997). In fact, in Michigan, extraordinary care was devoted to training observers, the vehicles were all stopped during observation, and special efforts were made to determine the lap belt use in view of the potential limitations in the HSRC (and IIHS) studies (F. M. Streff, personal communication, October 1995). Similar methods (with respect to this aspect, at least) were present in the Lehto studies. Interestingly, the lap belt use rates obtained in the Michigan studies (72%) and the Indiana-Arizona studies (61% and 68%) are considerably higher than the rates found in the HSRC (32%) and IIHS (45%) studies; they are also higher than most of the estimates of the three-point rates measured in about the same time frame. It is difficult to be certain that this measurement feature is responsible for the difference in outcomes, however, because this factor is confounded with geographical location, year, and other aspects.

Several other features make the HSRC data somewhat difficult to integrate with the other data sets (McCarthy & Conroy, 1990). Specifically, North Carolina is one of the few states that strongly enforces a primary MUL, together with other programs, to generate increased use rates. The overall shoulder belt use rate of nearly 60% for North Carolina was, at the time, greater than that in nearby regions (Datta & Guzek, 1992). In addition, compliance with Federal Motor Vehicle Safety Standard 208 requires the use of only a passive restraint system, which does not necessarily require a fastened lap belt – therefore, to minimally satisfy the MUL, the shoulder belt could be used without a buckled lap belt. Potential limits in generalizability are mentioned by the authors as well (Reinfurt et al., 1988, p. 12).

For these various reasons, we tend to view the HSRC’s estimate of the lap belt use rate in the automatic system with some skepticism (also F. M. Streff, personal communication, October 1995). It is important to note that removing this data set from the findings evaluated in Table 1, results in a manual three-point rate of 51% and a manual lap belt rate of 53%. This difference is also statistically significant, \( \chi^2 = 1282.4, p < .01 \), and provides no evidence for the conclusion that the automatic shoulder belt is interfering with the manual lap belt. In fact, the difference in favor of the automatic system suggests that the automatic shoulder belt slightly facilitates the propensity to fasten the lap belt, perhaps by acting as a kind of reminder to fasten the belt at start-up.

Finally, if the use rate for the manual three-point system is essentially similar to that for the manual lap belt in the automatic systems, this would suggest an interesting way to view the use rates of the two overall systems. Actively attaching the lap belt is done at about the same rate (roughly 50%–60%) regardless of the nature of the shoulder belt. For the automatic system, however, the shoulder belt is now fastened by an additional 30%–35% of drivers (90%–97% of automatic shoulder belts are found attached). This benefit in shoulder belt use without a drawback of reduced lap belt use will surely contribute to occupant safety in many crash situations.

**SUBJECTIVE SURVEY REPORTS**

One concern about automatic shoulder belt systems is that drivers might not be aware of the need to buckle the lap belt or the safety benefits of using the manual lap belt with the shoulder belt. To evaluate these contentions, we reviewed studies that reported drivers’ knowledge of the manual lap belt and the need to use it.
As has been pointed out before (Streff & Wagenaar, 1989), such survey results generally overestimate the belt use rates, perhaps by 12 percentage points. In any event, Lovvoll et al. (1994, Experiment 1) reported that 67% of surveyed drivers said that they use the manual lap belt in systems with automatic shoulder belts. A discount of 12 percentage points places this estimate (e.g., 55%) within the bounds provided by the direct observations.

The findings also reveal information about the driver’s knowledge of such systems and of why the systems are important. Lehto’s (1994) study of drivers at shopping malls revealed that, of the people driving in vehicles with automatic shoulder belts, 96.5% said that they were “supposed to” wear the lap belt. In addition, 94.4% of the respondents said that they generally knew why the lap belt was needed, indicating reasons such as safety, the law, or preventing injuries. Lehto also surveyed the drivers of vehicles with automatic motorized shoulder belts who were not wearing the lap belt at the time (but who were wearing the shoulder belt; 33% of the respondents). Of these drivers, 97% said that they were aware of the presence of the lap belt. In addition, when the drivers from these two categories were combined (i.e., those drivers who wore and did not wear the lap belt), 99.6% were aware of the presence of the lap belt. That is, only one of the 239 individuals surveyed did not know about the lap belt. Very similar findings were produced in Lehto’s (1995) Arizona study.

Finally, Lehto (1994) found that, among rental car drivers (who are presumably less familiar with their vehicles than owner-drivers) the lap belt use rate with automatic shoulder belts was 74.6% (81.2% for right-front passengers). This is somewhat higher than the rate found for drivers as a whole. Such a finding argues against the view that unfamiliarity with the vehicle (and hence with the operation of the automatic belt system) is a factor determining the rate of lap belt use.

Lovvoll et al. (1994) provided additional evidence of drivers’ awareness of the importance of seat belts, including the lap belt per se. Students at the University of Houston and volunteers at a shopping mall in Raleigh, North Carolina, responded to a questionnaire about their shoulder and lap belt use. When those participants who did not use a belt were asked about the reasons for lack of use, their responses most frequently included “forgetting” or “traveling a short distance” but not a lack of awareness. Based on questions concerning the likelihood of death or injury from wearing versus not wearing the various belt combinations, participants expressed a clear understanding of the lap belt’s safety benefits when worn in combination with the shoulder belt.

Williams et al. (1987) surveyed Ford and GM drivers in Wisconsin, North Carolina, and Maryland about their reported lap and shoulder belt use. About 86% of Ford drivers claimed that they used their lap belts “all the time” or “most of the time,” whereas only 1% of drivers surveyed said that they did not know that their vehicle had a lap belt. As found in other data sets, GM drivers tended to use their three-point automatic system as a manual system; 30% “never” used the system automatically.

Overall, these data indicate that automatic seat belt systems seem relatively well understood by the motoring public. Virtually everyone knows about the existence of the lap belt, and most know generally why it is important to use it.

**SUMMARY AND CONCLUDING REMARKS**

A number of generalizations emerge from our literature review of automatic seat belt systems. First, even though use of the manual three-point belt system has increased over the past few decades (to roughly 60%), use rates of the automatic shoulder belt are even more impressive: More than 95% of the population was observed with these shoulder belts in use.

The concern over the possibility that use of the manual lap belt in these automatic systems is degraded does not appear to be well founded. It is true that the rate of lap belt use in these automatic systems is less than that of shoulder belt use (about 50% vs. 95%, respectively). An important question, though, is whether the automatic shoulder belt has in some way degraded the driver’s voluntary action of buckling
the lap belt, or the action of buckling the lap belt is somehow omitted from the driver’s actions, similar to the way in which buckling the manual three-point system is omitted. A convenient way to examine these alternatives involves a comparison of the use rates of the lap belt versus those of the three-point manual belt, as both systems require one intentional action to buckle the lap belt.

Our review reveals that these rates are roughly the same, especially if the findings from the HSRC studies are neglected on methodological grounds (as discussed earlier). This similarity in rates suggests that the automatic shoulder belt does not induce one to forget to buckle the lap belt, nor does it provide a false sense of security that reduces motivation to buckle up. With this pattern of results – a high rate of shoulder belt use coupled with no important reduction in lap belt use – a large increase in restraint use above that with the three-point manual systems appears to be achieved with the automatic system.

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