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Comment: The Dominant Role of Driver Behavior in Traffic Safety

The article by Hingson et al.[1] in this issue of the Journal reports reductions in harm from traffic crashes associated with a Saving Lives Program. This program involves a set of initiatives all aimed at influencing the behavior of drivers by such means as speeding and drunk driving awareness days, media campaigns, and business information programs. The study finds that the program generated a 25% reduction in fatal crashes and a 42% reduction in fatal crashes involving alcohol. The proportion of vehicles observed speeding was cut in half.

The only other traffic-harm reductions of comparable magnitude are also associated with changes in driver behavior. Reducing the speed limit from 70 to 55 miles per hour reduced fatality rates on US rural interstate roads by 34%,[2] mandatory safety-belt wearing in the United Kingdom reduced front-seat occupant fatalities by 20%,[3] and random breath testing for alcohol in the Australian state of New South Wales reduced driver fatalities by 19%.[2,4]

In the 1970s, major studies in the United States[5] and the United Kingdom[6] identified factors associated with large samples of crashes. The research groups, which were unaware of each other's activities, obtained remarkably similar findings. The US study found the road user to be the sole factor in 57% of crashes, the roadway in 3%, and the vehicle in 2%; the corresponding values from the UK study were 65%, 2%, and 2%, respectively. In nearly all cases, the vehicular factor was in fact a vehicle maintenance problem, such as bald tires or worn brake linings. The road user was identified as a sole or contributing factor in 94% of crashes in the US study and in 95% of crashes in the UK study.

All the information above supports the core traffic safety research finding that changes in driver behavior offer, by far, the largest opportunities for harm reduction. A clear hierarchy of factors can be specified.[2] Human factors are far more important than engineering factors. Among human factors, driver behavior (what the driver *chooses to do*) has much greater influence on safety than driver performance (what the driver *can do*). Among engineering factors, roadway engineering has much greater influence than automotive engineering. The fatality rates on some road categories are 8 times that

Editor's Note. This comment, submitted from the author's home, reflects his personal views. He is employed by General Motors Corporation.

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on others.[2] In contrast, after controlling for driver behavior, vehicle mass, and vehicle model year, no clear differences in overall safety have been found between cars. In particular, there is no convincing evidence that results of the much publicized barrier crash tests correlate in any convincing way with real safety.

US priorities in traffic safety for much of the last 3 decades have been ordered almost perfectly opposite to where benefits are greatest. An obsessive focus on vehicular design factors left little energy or resources for more important factors. Even within one portion of the overall safety picture, namely, the protection of occupants when crashes occur, the same topsy-turvy ordering of priorities applied. Since the early 1970s, much of the motorized world passed laws requiring vehicle occupants to wear safety belts. These laws acknowledged that the greatest harm reduction was obtainable by this behavioral change. Instead, the United States indulged in a grand philosophical debate in which nontechnical so-called safety advocates promoted airbags rather than concentrating on passing belt-wearing laws. In the meantime, tens of thousands of Americans were killed who would have survived if the United States had adopted belt-wearing laws on the same schedule as, say, Canada. The fact that airbags were well known to be far less effective than safety belts seemed largely irrelevant to the deliberations.

Why does technical knowledge influence safety policy in the United States so much less than in other motorized countries? It seems to me that the explanation is, in part, because no other nation is burdened with a system resembling the US legal racket (I have previously[2,7] used the euphemism "legal industry.") In other democracies elected legislators with varied backgrounds are influenced by inputs from diverse sources, including the technical community. In the United States, lawyer legislators get nearly all their inputs from other lawyers. It is therefore not too surprising that measures that open deep pockets for legal assault are more appealing than measures that reduce harm. Only the most gullible can imagine that any net good emerges from the resulting system, which lavishly supports a pestilence of avaricious lawyers, "expert" witnesses, consultants skilled at identifying jurors lowest in knowledge and reasoning skills, and a vast court superstructure. The dramatically different ways a suspected defect in a vehicle is handled in the United States compared with that in eight other advanced industrialized democracies[8] illustrate clearly that other countries find nothing to emulate in our system. Even advocates of our system rarely conclude that US cars must be much safer than Swedish cars because we spend astronomically more per capita on litigation than does Sweden. The annual cost of the Saving Lives Program in one community pays US legal costs for 7 seconds. (To be fair, the legal racket does not just take care of traffic safety; it also gives us safe streets, crime-free schools, etc.)

Stressing that behavior is by far the most important factor in traffic safety is not to discount the importance, let alone the responsibility, of those who design and manufacture roads and vehicles. The engineering factors producing the largest safety benefits come at high costs; for example, replacing rural two-lane roads with interstate highways. Automotive engineering has made, and will continue to make, important contributions to passive occupant safety. The most effective passive protection is provided by increasing vehicle weight,[9] and a heavier fleet is a safer fleet.[10] A heavier fleet involves additional costs (purchase, running, energy, and emissions) and also raises troubling equity questions (while there is a net safety gain, some road users are less safe). Airbags increase passive safety, but by an amount that is small compared with the additional passive safety provided by additional mass. Airbags reduce a belted driver's fatality risk by about 9%,[11] a reduction equally obtainable by traveling in a vehicle about 200 pounds heavier.[2] The airbag benefit comes at extra purchase and repair cost and may pose increased risks to infants and out-of-position adults (another troubling equity question). It is fascinating to hear many of the proposals to negate these unintended consequences, involving as they do instructions to users that far exceed in complexity the simple instruction "wear your safety belt," which many airbag advocates vigorously asserted that the American public could never be persuaded to heed. In the case of behavioral changes, unintended consequences often are additional benefits; reducing drunk driving likely reduces alcohol-abuse problems unrelated to traffic.

Crash avoidance can reduce more harm than protecting road users when crashes occur. The key to avoiding crashes is changing the behavior of road users. High-technology innovations will make important transportation improvements. However, none can reduce crashes by nearly as much as the Saving Lives Program; indeed, the safety effect of most proposed high-technology innovations is of unknown sign.

In nearly all cases, effectiveness estimates quoted for occupant protection devices apply only to the protected occupant. Thus while car-driver airbags reduce fatality risk by 9% for belted drivers and by 21% for unbelted drivers[11] (say 15% on average), they do not materially affect risks to motorcyclists, pedalcyclists, pedestrians, and most other vehicle occupants. Because about one traffic fatality in three is a car driver, the device therefore reduces overall traffic fatalities by about 5%, a substantial reduction but much less than the 25% reduction from the Saving Lives Program. (It is unlikely that all cars having side airbags can generate as much as a 0.5% reduction).

A crucial difference between a reduction in overall traffic fatalities from crash avoidance and an identical reduction from occupant protection is that when a crash is avoided, all harm is prevented. In the occupant protection case, the prevented fatality is almost certainly converted to a different level of injury, generally a severe injury.

Mentioning behavioral factors in some circles can still lead to a charge that you are "blaming the victim." One development that has helped to discredit this once fashionable line of irrationality is the spread of acquired immunodeficiency syndrome (AIDS), which just about everyone agrees can best be arrested by behavior changes. It is trite to affirm that a passive solution (such as adding a drug to the water supply) would be preferable. It is similarly trite to affirm that passive solutions to traffic losses are preferable to behavioral solutions without regard to whether such solutions exist or can feasibly be developed.

The support of the Hingson et al. study by the National Highway Traffic Safety Administration, the agency responsible for federal traffic safety regulation, confirms an increasing national realization of the importance of behavioral factors. Hopefully, the results of this study will contribute to an increasing acceptance that we must technically evaluate countermeasures, and favor those that are estimated to reduce the most harm in the most acceptable manner. □

Leonard Evans
Bloomfield Hills, Mich