EXPOSURE DATA AND HIGHWAY DESIGN AND OPERATIONS ISSUES FOR TEEN DRIVERS

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In the human factors approach to driver safety, we view safe performance as an *interaction* between the driver, the vehicle, and the roadway. All three components are important, and the issues related to one component, such as inexperienced teen drivers, need to be understood and addressed with the other aspects of the system in mind as well. For the teen driver problem, we have given a great deal of attention to the driver issues and increasingly more attention to vehicle aspects (such as monitoring and feedback). The roadway component has been largely ignored. The emphasis on driver and vehicle is appropriate, since that is probably the biggest part of the problem and where we are likely to see the biggest returns. But that does not mean that the roadway component should be ignored. And unlike the driver and vehicle aspects, countermeasures on the roadway side remain in place once implemented. The question here is, Are there roadway design and operational aspects that are particular problems for teen drivers? About 10 years ago, we were asked by FHWA to take an initial look at this question. The motivation came from what FHWA perceived as a very successful long-term program aimed at improving roadway design and operations to better meet the abilities of older drivers. They felt they achieved better design not only for the older driver, but for the general public as well. FHWA thought the same model might be applied to novice teen drivers.

We looked at crash data from the Fatality Analysis Report System (FARS) and from an FHWA database of selected state data, the Highway Safety Information System (HSIS). Some interesting findings emerged but interpretation was very difficult because we did not have good exposure data. Comparisons were either relative (e.g., the percent of all crashes for an age group that occurred under a given condition) or based on per licensed driver exposure (which ignores differences in the amount and location of driving). For example, the fatal crash rate on urban interstate highways per licensed driver was the same for teens as for middle aged drivers (relative risk = 1.0). The crash rate on urban local roads per licensed driver was more than three times greater for teens than adults (relative risk = 3.4) and on rural local roads it was more than five times higher (relative risk = 5.4). Is this because interstate highways are much easier for teens to drive or because they do far less of their driving on these roads? We try to give novice drivers initial exposure on local roads, but maybe these are the most dangerous. If we had better roadway exposure data, we could do a much better job of finding where critical teen driver problems are and begin to address them from the roadway side. For example, a traffic engineer may have a certain amount of roadway cross-section available and the issue is, how does one best divide this among the travel lane(s), shoulder, and median treatment. The answer may be different for teens than middle-aged drivers. This could impact design in general or recommendations for areas with relatively high teen traffic. A good database for roadway exposure would tie location to roadway features, traffic control devices (signs, signals, markings), environmental surround, and operational aspects (e.g., speed limit, one way traffic, dual turn lanes), and weather conditions (rain, darkness, icy road surface). Some of these factors are easier to get than others, but all are potentially available as ITS and electronic databases evolve. Also, better exposure data by road characteristics would let us be more precise in evaluating changes in young driver safety and the general success of young driver countermeasures. We can take changes in road use over time into account in trying to interpret changes.