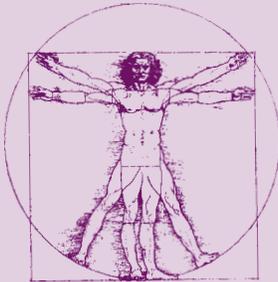


Research Update



HUMAN CENTERED S Y S T E M S

The Human Centered Systems Research Program addresses human performance-related issues that affect highway system design. Current human centered research focuses on Highway Safety and Intelligent Transportation Systems (ITS).

Human centered research products include driver performance models, highway system design guidelines, and handbooks based upon empirical human performance data collected in the laboratory and in controlled, on-the-road tests.



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YOUNG DRIVERS AND HIGHWAY DESIGN AND OPERATIONS: FINDINGS AND RECOMMENDED RESEARCH

Young drivers ages 16 to 24 constitute a high-risk driver group. According to data from the National Highway Traffic Safety Administration (NHTSA), young drivers have a higher risk of being involved in a collision. Drivers under the age of 21 are approximately 2.5 times more likely to be killed in a crash than drivers ages 25 to 69. Sixteen-year-old drivers have a particularly high fatality rate in terms of crashes per million miles driven. It is noteworthy that 16-year-olds drive comparatively few miles, so their crash fatality rate is an order-of-magnitude greater than the crash rate for 40-year-olds. The transportation safety community has investigated the young driver safety problem in graduated licensing programs, driver education, and traffic enforcement. However, less information is available about the relationship between young driver capabilities and characteristics and elements of highway design and operations.

Understanding the influence of design and operations on the driving performance of young drivers would support the development of safety countermeasures. Toward that goal, the Federal Highway Administration (FHWA) conducted a project that investigated the safety problems of young drivers in relation to highway design and operations that was entitled, "Preliminary Investigations of Highway Design Countermeasures to Aid Drivers With Limited Experience" (Contract No. DTFH61-98-C-00063). The objective of the project was to obtain preliminary information that supports the development of traffic engineering countermeasures aimed at improving the safety of young drivers. This TechBrief highlights the findings of the project and provides recommendations for future research.

Young Driver Characteristics and Capabilities

Young drivers have characteristics and capabilities that differ from those of mature drivers in several areas, including adolescent cognition and motivation, attitudes and beliefs, perception and control of risk, and visual search and attention. A literature review conducted during the project identified several characteristics of young drivers that are related to traffic engineering countermeasures. The findings of the literature review suggest differences in the following aspects:

- ▶ **Visual Search** Young drivers tend to have more vehicle-centered looking than up-road looking.
- ▶ **Automaticity** Young drivers have not acquired the automaticity of certain driving tasks that is gained with experience and that allows fluid switching between driving tasks under stressful conditions.
- ▶ **Hazard Detection** Young drivers, in general, detect traffic hazards less reliably and more slowly than experienced drivers.
- ▶ **Perception of Risk** Young drivers tend to perceive less risk associated with traffic hazards.
- ▶ **Attention Allocation** Young drivers are more easily distracted by non-driving-related events, such as conversations that occur between passengers in the car and controlling the vehicle audio system.
- ▶ **Self-Assessment** Young drivers tend to overestimate their ability to control a vehicle under emergency conditions.

- ▶ **Comprehension of Traffic Control Devices** Young drivers may not understand the meaning of traffic control devices as much as experienced drivers, and seem to use the devices less than is ideal.
- ▶ **Vehicle Control** Young drivers are less skilled at making emergency maneuvers and are vulnerable to overcorrection errors that lead to loss of control.
- ▶ **Anticipation** Young drivers, in general, show less ability to anticipate emerging traffic hazards.

Recommended Research

Figure 1 illustrates a set of six recommended research projects aimed at developing a solid base of knowledge about traffic engineering applications for young driver problems. The projects will clarify circumstances where young driver problems exist and will support efforts to develop countermeasures. The boxes on the left of the diagram show two broad problem identification projects. One of these projects consists of crash data analyses of detailed roadway information files and newly collected travel exposure data. The other focuses broadly on the difficulties young drivers have in searching the roadway and attending to relevant items and perceiving them correctly. The frequency and severity of driver search and attention problems would then be linked

to elements of roadway design and operations. The goal of these two projects is to identify the circumstances where young driver problems exist.

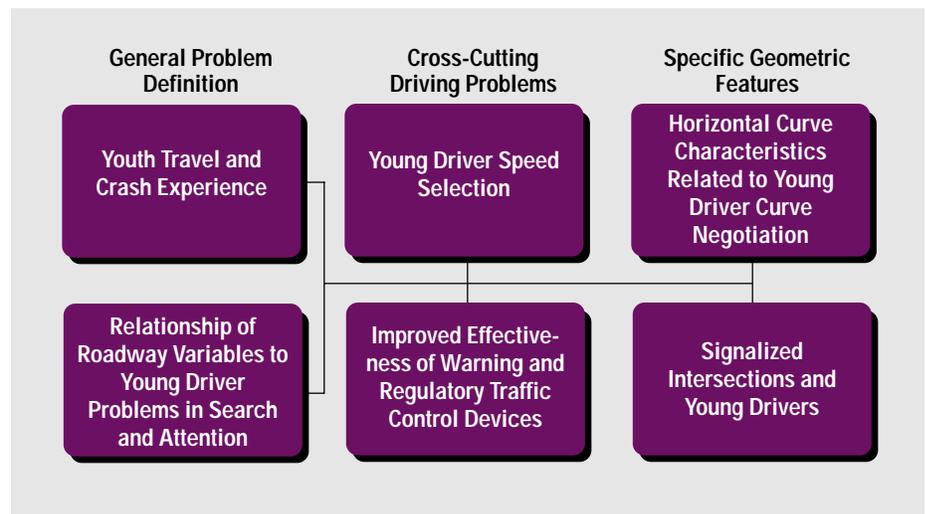
The next two projects (in the center of the illustration) are aimed at key issues in driving situations. One project concerns the determinants of speed selection by young drivers, while the other investigates the use and effectiveness of warning and regulatory traffic control devices. These projects will assess the problems young drivers have in these areas and develop and field-evaluate guidelines and countermeasures to overcome the problems.

The final two projects focus on specific roadway design features known to be problematic for young drivers. The first project concerns the negotiation of

horizontal curves, and the second investigates signalized intersections. These projects will analyze young driver problems in detail to develop improved design and operational guidelines and countermeasures. Given adequate time and funding, the six projects would be conducted in the sequence shown in the flowchart (left to right), with each project benefiting from the preceding projects. However, there is not a requirement to adhere to the sequence of projects, as any combination would be of value.

A detailed research problem statement for each of these recommended projects exists in the final report, including problem description, objective, scope, anticipated tasks and methodologies, projected level of effort, and potential benefits.

Figure 1. Recommended Research Projects.



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Key Words—Young drivers, safety, crash data.

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