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Editorial

Letter from the Editors — Strategic Highway Research Program's (SHRP 2)

The *Journal of Safety Research* is pleased to publish the results from two of the first research studies using the second Strategic Highway Research Program's (SHRP 2) naturalistic driving data set. SHRP 2 was authorized by the United States Congress to address some of the most pressing needs related to the nation's highway system. SHRP 2 is administered by the Transportation Research Board of the National Academies under a Memorandum of Understanding with the Federal Highway Administration and the American Association of State Highway and Transportation Officials. SHRP 2 focuses on applied research in the following four areas:

- Safety — Improve understanding of driver behavior to reduce the number and severity of highway crashes
- Renewal — Update aging infrastructure with more durable facilities using efficient design and construction methods that minimize disruption and work time
- Reliability — Reduce congestion through incident reduction, management, response, and mitigation
- Capacity — Plan and design transportation capacity with consideration of environmental and economic factors and the needs of the community.

The goal of the naturalistic driving study is to gain a better understanding of the interaction among the factors involved in highway crashes — driver, vehicle, and infrastructure. Based on this knowledge, it is hoped that better safety countermeasures will be developed and applied to save lives. To obtain this understanding, the largest naturalistic driving study to date was conducted. The two studies presented in this edition are the first results from this initiative.

These studies were conducted before the full data set was completed. Therefore, they are demonstration studies, and represent the type of research that is possible rather than stand as final or definitive results. See J. Hedlund's accompanying letter for a discussion of research constraints. In the coming years, it is anticipated that many researchers will use the SHRP 2 data set to explore important motor vehicle safety topics. The *Journal of Safety Research* invites these investigators to submit their findings. In addition, other researchers continue to conduct valuable behavior-based motor vehicle safety research using simulators and other controlled experimental designs. The Journal also invites these researchers to submit their papers.

All research methodologies have limitations, and no single methodology can fully explain the complex causal nature of crashes. The Journal invites all researchers conducting rigorous evidence-based investigations, regardless of the methods used or conclusions made, to consider submitting their studies. These studies add to the understanding of us all. Only through the publishing of findings in peer-reviewed journals and through the subsequent debate on the merits of the research can the field of motor vehicle safety research advance. In this light, the Journal invites thoughtful commentary on these two SHRP 2 studies. It is hoped that these first studies will help inspire future research to continue the investigation into motor vehicle safety.

Additional information about SHRP 2 can be found at: http://www.trb.org/StrategicHighwayResearchProgram2SHRP2/General.aspx.

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Editorial

SHRP 2 naturalistic driving study: The first data analysis studies

The second Strategic Highway Research Program (SHRP 2) conducted the largest and most comprehensive naturalistic driving study (NDS) ever undertaken. The study collected data from over 3,500 volunteer passenger vehicle drivers, ages 16–98, during a 3 year period, with most drivers participating between 1 and 2 years. The study was conducted in a site in each of six states: Florida, Indiana, New York, North Carolina, Pennsylvania, and Washington. The two predominantly rural sites in Indiana and Pennsylvania each covered about ten counties; the other four urban or mixed sites each covered one to three counties. The total study area included over 21,000 miles.

The data collected included vehicle speed, acceleration, and braking; vehicle controls when available; lane position; forward radar; and video views forward, to the rear, and on the driver's face and hands. The NDS data file contains about 35 million vehicle miles, 5.4 million trips, 2,705 near-crashes, 1,541 crashes, and more than 1 million hours of video, for a total of about 2 petabytes of data.

In parallel, the Roadway Information Database (RID) contains detailed roadway data collected on 12,538 centerline miles of highways in and around the study sites, about 200,000 highway miles of data from the highway inventories of the six study states, and additional data on crash histories, traffic and weather conditions, work zones, and ongoing safety campaigns in the study sites. The NDS and RID data can be linked to associate driving behavior with the roadway environment. Campbell (2012) provides an excellent brief overview of the study.

The study's central goal is to produce unparalleled data from which to study the role of driver performance and behavior in traffic safety and how driver behavior affects the risk of crashes. This involves understanding how the driver interacts with and adapts to the vehicle, the traffic environment, roadway characteristics, traffic control devices, and other environmental features. After-the-fact crash investigations can do this only indirectly. The NDS data record how drivers really drive and what they are doing just before they crash or almost crash. The NDS and RID data will be used for years to come to develop and evaluate safety countermeasures designed to prevent or reduce the severity of traffic crashes and injuries.

1. The first SHRP 2 NDS analysis projects

Four contracts were awarded in 2012 under SHRP 2 Project S08, Analysis of the SHRP 2 Naturalistic Driving Study Data, to study specific research questions using the early SHRP 2 NDS and RID data. An open competition solicited proposals to address topics of the contractor's own choosing that would have direct safety applications. The proposals were required to:

- lead to real-world applications and safety benefits — theoretical knowledge without potential applications is not a priority;
- be broadly applicable to a substantial number of drivers, roadways, and/or vehicles in the United States; and
- demonstrate the use of the unique NDS data — similar results could not be obtained from existing non-naturalistic data sets.

The four studies began in February 2012 and were conducted in two phases. In Phase 1, which concluded in December 2012, each contractor obtained an initial set of data, tested and refined their research plan, and developed a detailed plan for their full analyses. Three studies successfully completed this proof-of-concept and were selected for the full Phase 2. They obtained and analyzed a much richer though still preliminary data set and reported their results in July 2014. Their final reports, along with other reports documenting the NDS and RID data, are available from TRB at http://www.trb.org/Publications/PubsSHRP2ResearchReportsSafety.aspx. The *Journal of Safety Research* is pleased to present the results from two of the studies in the following papers:

Hallmark, S.L., Oneyear, N., Tyner, S., et al., *Analysis of Naturalistic Driving Study Data: Roadway Departures on Rural Two-Lane Curves*.

Hutton, J.M., Bauer, K.M., Fees, C.A., and Smiley, A., *Analysis of Naturalistic Driving Study Data: Offset Left-Turn Lanes*.

2. Constraints of the first SHRP 2 NDS analysis projects

These first three analysis studies were conducted while the NDS and RID data files were being built. This imposed constraints which affected their work substantially. The constraints included:

- Sample size: In summer 2013, when the studies requested their full data sets, the NDS data file was only about 25% complete. As a result, each study could obtain only a fraction of the trips of interest now available in the full NDS data.

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