Florida Department of Transportation Research

Naturalistic Bicycling Behavior Pilot Study

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Current Situation

Compared to automobile drivers, bicyclists experience higher rates of injuries and fatalities. Transportation agencies across the U.S. are working steadily to improve conditions for cyclists on a roadway system that has mostly been designed with vehicles in mind. But as the number of cyclists continues to increase, there are an increasing number of conflicts between bicycles and vehicles, too often with serious consequences for the cyclist. Understanding the behavior of drivers and cyclists is critical to understanding how these conflicts occur and to finding countermeasures that can help prevent them.

Research Objectives

To gain insight into bicyclists' behavior, University of South Florida researchers equipped the bicycles of 100 volunteers in the Tampa-St. Petersburg area with a device to collect data during the bicyclists' daily activities.

Project Activities

The researchers developed the Bicycle Data Acquisition System (BDAS), a cost-effective device capable of collecting data to illustrate the behavior of the cyclist as they use the roads. The BDAS

The BDAS' black boxes, mounted on the front and rear of this bicycle, contain sensors and cameras.

includes front and rear cameras, front, right, and rear proximity sensors, a digital thermometer, a 3-axis accelerometers, a 3-axis gyroscope, light level detectors, and a GPS receiver. A connected smartphone app sends rider responses and self-check information to a server.

Participants were recruited by email to University of South Florida groups, by sign-up sheets, and through a website. Follow-up phone calls resulted in the selection of 100 participants covering a wide range of ages and both genders. Participants' bicycles were then fitted with the BDAS. Data were collected for at least 20 hours of riding from each participant, exceeding data collections in previous studies and providing a solid basis for addressing the research topics.

Analysis of the collected data focused on six research topics: cyclist conflicts with right-turning drivers, cyclist conflicts with left-turning drivers, night riding, route choices, comparison of bicyclists who received formal bicycle-riding training with those who had not, and crashes/close calls and their contributing factors. Several patterns of behavior were found that might contribute to cyclist crashes. Female riders were more likely to fall into the categories High Risk and High Distraction, younger cyclists took many more risks than older riders, and formal bicycling training increased compliant behavior.

Based on these findings, the researchers recommended countermeasures, including outreach and education to at-risk groups, design of bike lanes to reduce conflicts, better lighting on roads with high bicycle volumes, and educating cyclists on using reflective clothing and gear.

Project Benefits

Better understanding the behavior and experience of bicyclists can reduce crashes through more focused educational and outreach efforts and roadway designs that are safer for bicyclists.

For more information, please see www.fdot.gov/research/.