



Motor-vehicle crash history and licensing outcomes for older drivers reported as medically impaired in Missouri

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ABSTRACT

The identification and evaluation of medically impaired drivers is an important safety issue. *Medical fitness to drive* is applicable to all ages but is particularly salient for older adults. Voluntary procedures, whereby various professionals and family members may report medical fitness concerns to State driver license bureaus, are common in the United States. This paper examines traffic crashes of drivers reported during 2001–2005 under the State of Missouri's voluntary reporting law (House Bill HB-1536) and the resulting licensing outcomes.

Missouri's law is non-specific as to age, but the mean age of reported drivers was 80. Reports were submitted by police officers (30%), license office staff (27%), physicians (20%), family members (16%), and others (7%). The most common medical condition was dementia/cognitive (45%). Crash history for reported drivers was higher than that of controls, dating back to 1993, reaching a peak in 2001 when the crash involvement of reported drivers was 9.3% vs. 2.2% for controls—a fourfold difference. The crash involvement of reported drivers decreased rapidly after, indicating the impact of HB-1536 reporting with subsequent license revocation and to a lesser degree, mortality. Of the 4,100 reported individuals, 144 (3.5%) retained a driver's license after the process.

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1. Introduction

There are 35+ million people over age 65 years in the United States (U.S.) with almost 5 million over age 85 (US Census Bureau, 2005). Twenty-one percent of the U.S. population will be over age 65 by the year 2050, representing over 86 million older adults (US Census Bureau, 2005). A major increase in the number of older drivers is expected based on current demographics (Dobbs, 2008; Retchin and Anapolle, 1993) and these drivers will retain their licenses longer than past generations (Hakamies-Blomqvist, 1994). Older drivers will also travel greater distances and take more trips than the current cohort (Rosenbloom, 2000).

Older drivers may have more favorable driving behavior profiles when compared to other age groups. For instance, they are less likely to travel in poor weather, drive on busy roadways or during rush hour, and they limit their driving at night (Ball et al., 1998). Older drivers are less likely to drive while intoxicated and are

more likely to obey speed limits (Lyman et al., 2002; Langford and Koppel, 2006). Studies show that many older adults make decisions to restrict their on-road exposure in response to perceived changes in health and function (Langford and Koppel, 2006; Ball et al., 1998). Still, other studies suggest that self-regulation is not always consistent in this group (e.g., Browning and Sims, 2007; Baldock et al., 2006; Stalvey and Owsley, 2003), and self-regulation “is clearly not a sufficient process alone to ensure safe driving among the elderly” (Fildes, 2008, p. 389).

As a group, older adults are at greater risk for health conditions that may impair driving ability (Darzins and Hull, 1999) and increase crash risk, especially after age 70 (Carr, 2000). In Alabama, McGwin and Brown (1999) found that 8.4% of the crashes of older adults had an associated medical illness as determined by a police officer, when compared to younger drivers (1.4%). In a study of fixed deficits that included vision and cognition, Hakamies-Blomqvist (1993) noted that 50% of fatal crashes involving an older driver had a medical factor that played a contributing role in comparison to just 10% for younger drivers. Research indicates that some drivers with a dementing illness continue to drive (Odenheimer, 1993). A study using a brief cognitive screen during driver license renewal found that as many as 6% of persons 65–69 years old and almost 20% of those 80+ years had health-related impairments (Stutts et al., 1998).

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A range of health conditions has been linked with crashes, licensing, and performance-based outcomes, including: neurological disorders (e.g., Alzheimer's disease, stroke, and epilepsy), vision disorders (e.g., cataracts, glaucoma, and macular degeneration), and joint/movement-related disorders, such as rheumatoid arthritis (Dobbs, 2005; Charlton et al., 2004). Chronic medical illnesses often progress in severity and may impair the ability to drive for a substantial minority of elders, resulting in increased crash risk if undetected or insufficiently addressed by health professionals.

The “medically fit” driver has sufficient vision, alertness, cognition, joint range of motion, and motor skills, to manage the operational, tactical, and strategic demands of driving (Michon, 1985; Anstey et al., 2005; Wang and Carr, 2004). Health conditions that detract meaningfully from these key abilities may increase crash risk, and thus require focused evaluation and intervention (Odenheimer, 2006; Dobbs and Carr, 2005). Not all drivers age in the same way, however, and a major challenge is how to separate the subgroup of “medically-at-risk” older drivers from the total population (see discussions in Dobbs, 2008; Molnar and Eby, 2008).

The concept of *medical fitness to drive* (MFD) is applicable to all age groups and it is particularly salient for older adults. Most U.S. states utilize voluntary procedures to address MFD concerns, whereby various professionals and/or family members may report concerns to State Driver's License Bureaus (DLB) (Morrisey and Grabowski, 2005).

When a report is made, a DLB may require medical evaluation and/or driving-related testing (written, vision, and/or on-road) to inform the license eligibility decision. Should a physician identify an MFD-related concern, the physician can report the driver to a DLB for evaluation and possible license revocation. A few U.S. states, such as Maryland, utilize detailed, age-specific evaluation protocols (Staplin et al., 2003), whereas others, such as Missouri, evaluate older drivers using standard driving tests applied at any age. A handful of U.S. states, including California, Delaware, New Jersey, Oregon, and Pennsylvania, mandate that certain MFD-related health conditions (e.g., Alzheimer's disease, epilepsy) *must be reported* to the DLB for evaluation at the time of diagnosis (Wang et al., 2003).

Although much is known about medical conditions and driving, the translation of this knowledge to driver licensing and individual driver safety needs more attention. A DLB requires reliable and valid processes for evaluating driving competency (Christie, 2000). A report from the Organization of Economic Cooperation and Development expressed support for a more focused, consistent approach to older driver evaluation and licensing (OECD, 2001). The OECD report argued that crash risk is largely a function of medical illnesses and associated functional deficits, many of which are more prevalent with aging. Thus, OECD recommended that future efforts for evaluating older driver safety should target medically impaired drivers and not older adults in general (OECD, 2001).

One promising approach is to incorporate research on MFD into driver licensing procedures. In this way, drivers with medical conditions can be identified, and their problems can be addressed through education, use of adaptive equipment, license restrictions, and/or license revocation when appropriate. In order to target drivers with medical impairments there must also be a policy or law that allows for DLB referrals from health professionals, law enforcement, and family members.

Little systemic information is known about how drivers are reported to DLBs under voluntary reporting mechanisms, the drivers' characteristics and health status, and – most importantly – what happens in terms of driver licensing and protection of public safety.

This paper is drawn from a project that evaluated the functional impact of the State of Missouri's voluntary reporting law (House Bill HB-1536), passed in 1999, for drivers considered as potentially

unfit to drive due to medical impairment (Meuser et al., 2008). HB-1536 provides a voluntary, legal process whereby concerned family members, police officers, physicians, and others can report a driver for evaluation and/or possible license revocation. The reporter's identity is confidential, and HB-1536 provides civil immunity protection from prosecution for breach of confidentiality. HB-1536 is non-specific with regard to age, and includes a Medical Advisory Board to review complex cases. This board is composed of three licensed physicians appointed by the Director of Revenue. The law is administered through the DLB of the Missouri Department of Revenue. On-road testing of reported drivers is conducted through the Driver Examination Division of the Missouri State Highway Patrol (MSHP) utilizing a standardized operational test applied to all drivers.

The HB-1536 process is depicted in Fig. 1 along with boundary years for the crash investigation described in this paper.

This effort to evaluate the efficacy of HB-1536 is an outgrowth of an educational initiative to train physicians and other health-care professionals about MFD assessment and reporting procedures (Meuser et al., 2006). An important goal was to change behavior, such that health professionals would incorporate evaluation of MFD into regular patient care activities.

This research addresses a number of questions concerning reported individuals: Who initiates reports, what are the prevalent medical conditions noted, what is the crash history of reported drivers and how does it compare to controls, what are the licensing outcomes from the process?

2. Data collection

Reports under HB-1536 are maintained and stored at the Department of Revenue (DOR), Jefferson City, Missouri. Most data for this project were retrieved from archival sources: microfilm images (reports received 2004 and before) and scanned images (reports from 2005+).

Fig. 1 depicts the HB-1536 reporting process and the primary data sources: report of a MFD concern, physician's medical evaluation, on-road testing, licensing outcome, and crash history. HB-1536 was implemented in 1999, but with few reports in the first two years. From January 2001 through December 2005, 5362 drivers were reported to DOR as potentially medically unfit to drive. The majority, 4987 (93%), were age 50 and older at the time of report, and 4134 (83%) were age 70 and older. This research focuses on those 50 and older, and material from 4100 cases (87% of all cases) were reviewed. Some cases were omitted due to time constraints for data collection. First, a pilot set of 389 cases was used to develop and test coding schemes, reliability and stability of hand data entry, etc. (Meuser et al., 2008).

Approximately 15,000 pages were reviewed. The average time to build a case packet and hand enter data was 20 min; thus, the 4100 case sample required 1350 person hours. Codes were assigned to each individual for confidential tracking and data analysis. Only coded, de-identified data were taken off-site for analysis. A detailed description of the data collection effort is given by Meuser et al. (2008).

The DOR assisted in developing a control sample of non-reported drivers. The DOR extracted gender and birth year for licensed drivers born during selected weeks resulting in a large pool of non-reported drivers. Cross-classifications of birth year and gender were tabulated. The year–gender combination with the fewest individuals in the control group was 2.8 times larger than the same combination in the reported sample. A uniform random distribution was used to sample from the control pool to yield a 2.8:1 control sample that has the same birth year and gender distribution as the reported drivers, resulting in a control sample of 11,615 unreported drivers, born 1900–1955.

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