Journal of Safety Research 42 (2011) 67–71

Contents lists available at ScienceDirect

Journal of Safety Research

journal homepage: www.elsevier.com/locate/jsr

Special Report from the CDC

Driving self-restriction in high-risk conditions: How do older drivers compare to others?☆

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The Journal of Safety Research has partnered with the Office of the Associate Director for Science, Division of Unintentional Injury Prevention in the National Center for Injury Prevention & Control at the Centers for Disease Control and Prevention (CDC) in Atlanta, Georgia, USA, to briefly report on some of the latest findings in the research community. This report is the 21st in a series of CDC articles. Look for other such articles in future issues of the Journal of Safety Research.

ARTICLE INFO

Article history:
Received 15 December 2010
Accepted 15 December 2010
Available online 5 January 2011

Keywords:
Motor vehicle
Self-restriction
Older adult

ABSTRACT

Introduction: Many older drivers self-restrict or avoid driving under high-risk conditions. Little is known about the onset of driving self-restrictions or how widespread self-restrictions are among drivers of all ages. *Methods:* The Second Injury Control and Risk Survey (ICARIS-2) was a nationwide cross-sectional, list-assisted random-digit-dial telephone survey from 2001 to 2003. National prevalence estimates and weighted percentages of those reporting driving self-restrictions were calculated. Multivariable logistic regression was used to explore associations between specific self-restrictions and age group, adjusting for other personal characteristics. *Results:* More than half of all drivers reported at least one driving self-restriction. The most commonly reported restriction was avoidance of driving in bad weather (47.5%), followed by at night (27.9%) and on highways or high-speed roads (19%). A greater percentage of young adult women (18-24 years) reported self-restricting in bad weather compared to women in other age groups, and the percentage of drivers self-restricting at night, in bad weather, and on highways or high-speed roads increased steeply after age 64. We found that women, those in low income groups, and those who had driven low annual mileage were more likely to self-restrict. *Conclusions:* In addition to assessing self-restrictions among older drivers, a new finding from our study is that self-restrictions are also quite prevalent among younger age groups. Driving self-restrictions may be better understood as a spectrum across ages in which drivers' reasons for restriction change. *Impact on industry:* Future research on the ability of driving self-restrictions to reduce actual crash risk and prevent injuries is needed.

1. Introduction

In 2009 motor vehicle-related crashes killed nearly 34,000 persons in the United States, and older adults were over-represented among these victims (National Highway Traffic Safety Administration [NHTSA], 2010). Adults age 65 or older represented 16% of motor-vehicle crash deaths, yet 13% of the U.S. population. Research has shown that older adults have high motor vehicle-related injury and fatality rates, likely in part due to increased frailty, but that they also have high use of safe driving behaviors (Li, Braver, & Chen, 2003). Older adults are less likely to engage in alcohol-impaired driving, less likely to speed, and more likely to wear their seat belts, when compared to younger age groups (NHTSA, 2009a, 2009b). Additionally, older drivers often adapt their driving patterns to avoid driving under high-risk conditions (Baldock, Mathias, McLean, & Berndt, 2006; Ball et al., 1998; Hakamies-Blomqvist & Wahlstrom, 1998; Lyman, McGwin, & Sims, 2001). These adaptations are often referred to as driving "self-regulation" or "self-restriction" and may include avoidance of driving at night, driving slower, decreasing the number of trips, or avoiding driving during high traffic periods. While the relationship between driving self-restrictions and actual crash risk remains unclear, self-restrictions may be one way for older adults to maintain mobility while reducing their exposure to challenging driving situations (Ball et al., 1998; Owsley, McGwin, Phillips, McNeal, & Stalvey, 2004).

☆ Disclaimer: The findings and conclusions in this report are those of the authors and do not necessarily represent the official position of the Centers for Disease Control and Prevention.

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0022-4375/$ – see front matter.
doi:10.1016/j.jsr.2010.12.001

Driving self-restriction is a complex process that is influenced by many factors, including cognitive functioning, vision, and driving confidence, and has largely been studied in drivers over the age of 55 or 65 (Ball et al., 1998; Betz & Lowenstein, 2010; Charlton et al., 2006; Hakamies-Blomqvist & Wahlstrom, 1998; Lyman et al., 2001). However, little is known about the onset of driving self-restrictions or how widespread self-restrictions are among drivers age 18 years and older. The purpose of this study was to examine self-reported driving self-restrictions such as avoidance of driving at night, in bad weather, and on highways or high-speed roads in relation to age and other personal characteristics.

2. Methods

The Second Injury Control and Risk Survey (ICARIS-2) was a cross-sectional, list-assisted, random-digit dialed telephone survey conducted by the Centers for Disease Control and Prevention (CDC) from mid-2001 through early 2003. The target population included English- or Spanish-speaking adults (at least 18 years of age) living in one of the 50 United States or the District of Columbia. The sampling frame covered approximately 96% of households with landline telephones in the United States (Brick, Waksberg, Kulp, & Starer, 1995). Racial and ethnic minorities were over-sampled to ensure adequate representation. Data were weighted to adjust for the complex sample design, non-response, and non-coverage. All survey questions, materials, and interview protocols were approved by CDC's Institutional Review Board. Study methodologies have been published previously (Chen, Kresnow, Simon, & Dellinger, 2007).

Respondents were included in this study if they had a drivers license, had reported their age and sex, and had reported that they had driven at least once in the 30 days prior to interview. These drivers were read the following questions, "Some people avoid certain driving situations. Do you tend to avoid driving…at night? ... in bad weather? ... on highways or high-speed roads?" Responses were coded as "yes" or "no." Drivers were also asked how many miles they had driven in the last year. If the recorded answer exceeded 50,000 miles, these records were censored as outliers (5.6% of responses). Similar censoring of outliers for self-reported miles driven has occurred in previous research (Handy, Cao, & Mokhtarian, 2005; Pickrell & Schimek, 1998).

All analyses were conducted using software that accounts for the complex design of the survey (SAS version 9.1, Cary, North Carolina: SAS Institute Inc., 2000-2004; SUDAAN, release 901, Research Triangle Park, North Carolina: Research Triangle Institute, 2005). National prevalence estimates and nationally weighted percentages were calculated. Multivariable logistic regression was used to explore associations between specific self-restrictions and age group, adjusting for gender, income, marital status, and self-reported miles driven in the previous year. Interactions between age group and each of the other model variables were assessed using backwards stepwise regression methods. In all instances, p-values <0.05 were considered statistically significant.

3. Results

Among the 8,129 respondents included in this study, more than half (53.5%) reported at least one driving self-restriction. The most commonly reported restriction was avoidance of driving in bad weather (47.5%; Table 1). An estimated 87 million drivers avoided driving in bad weather. More than a quarter (27.9%), or 51 million drivers, avoided driving at night, and 19%, or 35 million drivers, avoided driving on highways or high-speed roads.

A significantly higher percentage of women, compared to men, reported each of the self-restrictions (Table 1). Differences also existed by income with a larger proportion of persons with lower incomes (<$20,000) reporting each of the driving restrictions, compared to those with higher incomes. For example, 44.5% (95% CI: 40.8%-48.3%) of persons with an annual income less than $20,000 avoided driving at night compared to 21.0% (95% CI: 19.6%-22.6%) with an annual income greater than or equal to $35,000. Also, a larger proportion of persons with lower annual mileage reported self-restricting under each of the three conditions, compared to those who drove a higher annual mileage.

Fig. 1 displays the percentage of persons in each age group by gender who reported self-restricting under each of the three driving conditions. Women ages 18-24 years had a statistically greater proportion of persons who reported self-restricting in bad weather, compared to women in other age groups. Among 18-24 year-old women, 64.5% (95% CI: 57.6%-70.8%) reported self-restricting in bad weather compared to 52.5% (95% CI: 47.7%-57.2%) of 45-54 year old women and 50.8% (95% CI: 45.2%-56.4%) of 55-64 year old women. Within each category of self-restriction, women restricted more than men, and following a low among the middle age groups, the prevalence of self-restriction increased steeply after ages 55-64 years.

Table 2 displays adjusted odds ratios for reporting each of the three driving self-restrictions that all adult drivers were asked about. After adjusting for sex, income group, marital status, and annual miles driven, older age groups were more likely to self-restrict their driving at night compared to the youngest age group (AOR for 65-74 year-olds: 2.22; 95% CI: 1.55-3.19 and for 75+: 2.89; 95% CI: 1.91-4.36). Women were about two times more likely than men to report restricting at night (AOR = 1.80; 95% CI: 1.54-2.11), in bad weather (AOR = 2.16; 95% CI: 1.89-2.46), and on high-speed roads (AOR = 1.72; 95% CI: 1.44-2.06). Income group was also significantly associated with reporting self-restrictions. Persons with lower incomes (less than $20,000) were 1.66 to 2.32 times more likely to report a self-restriction and persons with incomes between $20,000 and $35,000 were 1.50 to 1.90 times more likely to report a self-restriction, compared to persons with incomes greater than or equal to $35,000. Annual mileage driven was inversely associated with self-restrictions, such that higher mileage was associated with a lower likelihood of restricting at night (AOR = 0.79; 95% CI: 0.75-0.83), in bad weather (AOR = 0.84; 95% CI: 0.80-0.88), and on high-speed roads (AOR = 0.72; 95% CI: 0.68-0.77).

4. Discussion

We found that about half of all drivers, or an estimated 87 million persons, self-restricted their driving in bad weather, 51 million self-restricted at night, and 35 million self-restricted on highways or high-speed roads. Research estimating the prevalence of driving self-restrictions has produced a wide-range of estimates. For example, estimates for the percentage of older drivers who report avoidance of driving at night have ranged from 8% to 80% (Baldock et al., 2006; Ball et al., 1998; Molnar & Eby, 2008). Considerable variability in the methods and questions used to assess self-restriction make it difficult to estimate accurately the true prevalence, but studies agree that these adaptations are a common practice among older adults (Baldock et al., 2006; Ball et al., 1998; Hakamies-Blomqvist & Wahlstrom, 1998; Lyman et al., 2001; Molnar & Eby, 2008). In addition to assessing self-restrictions among older drivers, a new finding from our study is that self-restrictions are also quite prevalent among younger age groups. Twenty-five percent of drivers between the ages of 18-24 reported avoidance of driving at night, 50% reported avoidance of driving in bad weather, and nearly 20% reported avoiding driving on highways or high-speed roads.