Accident Analysis and Prevention 107 (2017) 110–116

Contents lists available at ScienceDirect

Accident Analysis and Prevention

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

The epidemiology of driving in later life: Sociodemographic, health and functional characteristics, predictors of incident cessation, and driving expectations

Kaarin J. Anstey*, Xiaolan Li, Diane E. Hosking, Ranmalee Eramudugolla

The Centre for Research on Ageing, Health and Wellbeing, Research School of Population Health, Florey Building 54, Mills Rd, The Australian National University, Australia

ARTICLE INFO

Keywords:
Older drivers
Epidemiology
Driving cessation
Cohort
Ageing
Longitudinal

ABSTRACT

Aim: To describe population-level characteristics of drivers and non-drivers in a cohort of older Australians and identify predictors of driving cessation and expectations.

Methods: The sample comprised the oldest cohort of the PATH Through Life project who were assessed 4 times between 2001 and 2013. At waves 3 and 4 questions on driving were included in the study interview. Data were also collected on health, physical and cognitive function and psychosocial wellbeing. Descriptive analyses compared drivers and non-drivers on sociodemographic, health and functional variables and regression models identified predictors of cessation and driving expectations.

Results: 92.5% of the sample were current drivers. They reported better physical, mental and cognitive health than non-drivers. Drivers expected to drive for another 12.6 years, the majority drove 6+ days per week. Four percent of the sample ceased driving over the four year follow-up. Predictors of cessation were financial problems, driving expectations and driving fewer kilometres per week. Predictors of expectations were poorer self-rated health, mastery, difficulties reading maps, self-rated visual function, years of driving experience, and fewer kilometres driven per week.

Conclusion: Driving is normative for many older Australians in their 70s. Similar factors are associated with actual cessation and expectation of driving suggesting that older adults do have a sense of their expected driving life.

1. Introduction

Population ageing will lead to an increased number of older drivers. National crash statistics show that older driver crash rates are increasing and are now higher than those of younger adults in Australia (BITRE, 2016), and countries with similar geography such as the United States (National Highway Traffic Safety Administration, 2012) and Canada (Transport Canada, 2014). Moreover, health care costs are higher for older adults injured in crashes, compared with younger adults. In Australia, adults aged 75+ who are injured and hospitalised in a road crash spend on average 7 days in hospital, whereas adults aged between 25 and 54 spend 4 days on average in hospital (BITRE, 2016). Driving is however integral to social engagement, quality of life, access to services and health, personal freedom and human rights. The growing numbers of older drivers and the complex societal task of managing risk and balance freedom, means there is a need for an evidence base on the epidemiology of older drivers.

Characterisation of health, social patterns and functional capacity associated with driving, and driving cessation is essential for development of broader policy perspectives to optimise the wellbeing of older adults and the health and safety of the general population (Anstey et al., 2016). Most research on older drivers has used clinical samples or volunteer samples. Large scale studies of older drivers have often included only drivers (e.g. the large CANDrive study (n = 962) (Marshall et al., 2013)). Although population based data have been reported from the Established Populations of Epidemiologic Studies in the Elderly (EPESE) from the USA (Marottoli et al., 1997) and OHS from Canada (Chipman et al., 1998) this data was collected 30 years ago, and different trends may be apparent in predictors of driving (Gwyther, 2013; Mizenko et al., 2015; Mullen et al., 2013), and mobility needs (Alsnih and Hensher, 2003) in current and emerging older adults. There is therefore a need for descriptive data on older drivers from population-based samples that are representative of the current population that will enable characterization of drivers with respect to demographic,

* Corresponding author at: The Australian National University, Australia.
E-mail address: kaarin.anstey@anu.edu.au (K.J. Anstey).

http://dx.doi.org/10.1016/j.aap.2017.07.026
Received 13 November 2016; Received in revised form 25 June 2017; Accepted 28 July 2017

health and social characteristics.

Much research into older drivers has focussed on driving cessation or 'retiring from driving'. This stems from concerns both about the negative impacts of driving cessation, the need to develop models and pathways for transitions to non-driving and the need to identify drivers who are unsafe. Although health factors are often cited by older ex-drivers as a reason for driving cessation (Dellinger et al., 2001; Hakamies-Blomqvist and Wahlström, 1998), those who voluntarily stop driving are not necessarily in poorer health than continuing drivers (Anstey et al., 2006; Dellinger et al., 2001), or have health conditions that do not place them at higher crash risk (Hakamies-Blomqvist and Wahlström, 1998; Lafont et al., 2008). Factors found to correlate with driving cessation and restriction include female gender, older age, lower education, less driving experience, and marital status (Anstey et al., 2006; Chipman et al., 1998; Dellinger et al., 2001; Gwyther and Holland, 2012; Hakamies-Blomqvist and Wahlström, 1998; Huisingh et al., 2016; Kostyniuk et al., 2000; Lafont et al., 2008; Marottoli et al., 1997; West et al., 2003), of which only age is a reliable predictor of driving safety in older adults. Cessation of driving increases social isolation (Marottoli et al., 2000; Mezuk and Rebok, 2008), depression (Marottoli et al., 1997; Ragland et al., 2005), health decline (Edwards et al., 2009b), and mortality (Edwards et al., 2009b) in older adults. Driving expectations (how many years an individual expects to drive) may also be a key factor in determining driving participation and eventual cessation among older adults, but there is little normative data on this. In the present study we aimed to establish an evidence base on the epidemiology of driving in older adults. We describe the demographic, cognitive, health and psychosocial characteristics of driving participation and non-participation. We estimated incidence of driving cessation over 4 years, predictors of cessation, and predictions of driving expectations.

2. Material and methods

2.1. Study sample

Our sample was drawn from the PATH Through Life Project, a large community survey concerned with the health and well-being of randomly selected individuals from the electoral rolls of Canberra or the neighbouring town of Queanbeyan, Australia (Anstey et al., 2012). Results presented here concern the wave 3 (treated as baseline, when driving questions were introduced) and wave 4 data for the older cohort, who were aged 60- to 64-years-old at Wave 1. The cohort was aged 68- to 72-years-old in wave 3 ("Baseline" n = 1806), and 72- to 76-years-old ("Follow-up" n = 1643) in wave 4. For the study duration, over 95% of participants were living independently in the community either alone or with a spouse.

2.2. Procedure

The study was approved by the Human Research Ethics Committee at the Australian National University. Written informed consent was obtained from all participants. Participants were asked to complete a questionnaire on hand-held computers under the supervision of a professional interviewer that covered socio-demographic characteristics, mental health, well-being, physical health, health habits, use of health services, personality, coping, early life psychosocial risk factors, current psychosocial risk factors, nutrition and driving.

2.3. Demographic variables

The questionnaire included a series of questions about age, gender, education, marital status and financial problems.

2.4. Health variables

Self-reported history of heart problems, diabetes, asthma, eye diseases, number of falls, and current smoking status were collected. General physical health was assessed using the short-form SF-12 Physical Health Summary Scale (Ware et al., 1994) with higher scores indicating better health. Forced expiratory volume at one second (FEV_1) and forced vital capacity (FVC) were measured in litres using a spirometer (Micro Medical Limited, Rochester, Kent, UK). Grip strength was taken using the Smedley hand dynamometer (Model No PE & , Stoelting Co., Wood Dale, Illinois), which measures the force exerted in kilograms. Visual acuity was measured using a 3-m Snellen chart. A participant's score was the total number of letters readable, and scores ranged from 0 to 28. Participants were asked about difficulties with instrumental activities of daily living (IADLs) such as reading maps, following recipes (Fonda and Herzog, 2004). Anxiety and depression symptoms in the past month were assessed by the Goldberg anxiety and depression scales (Goldberg et al., 1988), which give scores of 0–9 for number of symptoms of anxiety and of depression. Self-report level of physical activity was categorised as mild, moderate or vigorous according to intensity, frequency and duration of activities (Stafford et al., 1998).

2.5. Cognitive variables

Participants were tested using Mini Mental State Examination (MMSE) (Folstein et al., 1975) and three tasks sensitive to age-related cognitive decline. The Symbol-Digit Modalities Test (SDMT) (Smith, 1982), the California Verbal Learning Test (CVLT) (Delis et al., 1987), and parts A and B of the Trail Making Test (TMT) (Reitan, 1971). The SDMT is a measure of processing speed and requires participants to use a coded key to match the 9 abstract symbols paired with digits (Smith, 1982). The final score is the correct number of substitutions in 90 s. The CVLT assess verbal learning and memory. Participants are presented with a list of 16 words and the outcome measure is the number of words correctly recalled. The TMT comprises of two parts. In Part A, the participant connects 25 numbers in order and for Part B connects numbers and letters in numerical and alphabetical order. The score is the total time taken to complete each part. The TMT assesses processing speed, mental flexibility and visual-motor skills.

2.6. Psychosocial variables

Social activity engagement was assessed by the Lubben 6-item Social Network Scale (Lubben et al., 2006). For friends and relatives separately, participants were asked to report how many they saw at least once a month, how many they felt comfortable with asking for help, and how many they felt close to. Participants nominated whether they cared for grandchildren or relatives and how frequently they undertook volunteering activities. Sense of control over life was assessed by Pearlin's Mastery Scale (Pearlin and Schooler, 1978); participants indicate their level of agreement with seven statements regarding control beliefs.

2.7. Driving variables

Participants were asked about their driving status, experience, how many more years they expect to drive (driving expectancy), weekly driving frequency and distance, and self-reported crash history using questions from our previous studies (e.g., Wood et al., 2009).

2.8. Data analysis

Analyses were conducted in IBM SPSS23 (Armok, NY, USA). We calculated descriptive statistics of the sample using chi-square for categorical data and *t*-tests for continuous variables. The sample was split