Seniors face serious driving safety and mobility issues.

Self-Regulation of Driving by Older Adults

A LongROAD Study

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Title

Self-Regulation of Driving by Older Adults: A Synthesis of the Literature and Framework for Future Research. *(December 2015)*

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About the Sponsor

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About LongROAD

Safe mobility is essential to healthy aging. Recognizing that lifestyle changes, along with innovative technologies and medical advancements, will have a significant impact on the driving experiences of the baby boomer generation, the AAA Foundation for Traffic Safety has launched a multi-year research program to more fully understand the driving patterns and trends of older drivers in the United States. This multi-year prospective cohort study is being conducted at 5 sites throughout the country, with 3,000 participants, tracking 5+ years of driving behaviors and medical conditions. The multidisciplinary team assembled to investigate this issue is led by experienced researchers from Columbia University, University of Michigan Transportation Research Institute and the Urban Institute.

The LongROAD (Longitudinal Research on Aging Drivers) Study is designed to generate the largest and most comprehensive data base about senior drivers in existence and will support in-depth studies of senior driving and mobility to better understand risks and develop effective countermeasures. Specific emphasis is being placed on issues related to medications, medical conditions, driving patterns, driving exposure, self-regulation, and crash risk, along with mobility options for older Americans who no longer drive.

Abstract

Background

Self-regulation, or the modification of driving by driving less or avoiding challenging situations in response to declining abilities, is increasingly being studied as a way to help older drivers maintain independence and extend the period over which they can safely drive. However, considerable research gaps remain with respect to whether older drivers can accurately adjust their driving in response to their age-related declines, the extent to which older drivers engage in self-regulatory behaviors, the factors affecting self-regulation, and the extent to which it actually improves safety and mobility.

Objectives

The overall purpose of this paper is to report findings from an extensive synthesis of the literature on self-regulation of driving among older adults. The synthesis builds on earlier reviews of the literature by the authors, as well as extends literature findings on specific aspects self-regulation.

Methods

A set of search terms was developed that included combinations of three subsets of terms: self-regulation terms, driving terms, and aging terms. The search terms were used to target key journal articles, technical reports, conference papers and proceedings, white papers, books, and other documents on the topic. Inclusion criteria for the review included: 1) published primary quantitative or qualitative studies reporting results in English; 2) studies including older drivers as at least part of the sample; and 3) publications from 2009 onward, supplemented by our repository of relevant pre-2009 publications from earlier exhaustive reviews.

Results

Findings from the synthesis are presented with regard to prevalence and type of self-regulation, factors associated with self-regulation, and limitations of the self-regulation literature.

Conclusions

A framework for future research is needed that represents a more comprehensive, theoretically-informed, and uniform approach to understanding how older drivers self-regulate their driving at multiple levels of driver performance and decision making. A set of recommendations for such a framework is proposed.

Introduction

The issues around older driver safety and mobility have received considerable societal attention over the past several years due to the aging of the population (National Institute on Aging, 2011), trends toward increased licensure and driving by older adults (Sivak & Schoettle, 2011), and the overrepresentation of older drivers, at least after age 70, in fatal motor vehicle crashes (Insurance Institute for Highway Safety, 2010). Fragility and frailty may play an important role in current fatality rates (Langford & Koppel, 2006; Organization for Economic Co-operation and Development, OECD, 2001). However, safe driving can also be compromised by declines in driving-related cognitive, visual, and psychomotor abilities due to medical conditions that become more prevalent with aging, the medications used to treat these conditions, and the aging process itself (Eby, Molnar & Kartje, 2009; Molnar, Eby, St. Louis & Neumeyer, 2007).

Self-regulation, or the modification of driving by driving less or avoiding challenging situations in response to declining abilities, is increasingly being studied as a way to help older drivers maintain independence and extend the period over which they can safely drive (Gwyther & Holland, 2012; Wong, Smith & Sullivan, 2012). Strategies for helping balance the often conflicting needs for public safety and personal mobility are important for several reasons. First, older adults, like other age groups, prefer driving as their primary means of transportation in the community and consider driving to be vital to their well-being and independence (Carp, 1988; Hassan, King & Watt, 2015; Kaplan, 1995). Second, studies have identified a number of adverse consequences associated with driving cessation including: loss of independence and mobility (Adler & Rottunda, 2006; Al-Hassani & Alotaibi, 2014; Bauer, Rottunda & Adler, 2003; Dobbs & Dobbs, 1997); increased social isolation (Liddle, McKenna & Broome, 2004; Ragland, Satariano & MacLeod, 2004); increased depressive symptoms (Chihuri et al., 2015; Fonda, Wallace & Herzog, 2001; Marottoli et al., 1997; Ragland, Satariano & MacLeod, 2005); higher risk of nursing home placement (Freeman, Gange, Muñoz & West, 2006); and more general accelerated health declines (Edwards, Lunsman, Perkins, Rebok & Roth, 2009).

Third, to the extent that older drivers self-regulate appropriately, the burden on society to intervene with this population might be reduced. For example, voluntary self-restriction by older drivers could lessen the need for mandatory restriction by licensing agencies (which would still require compliance by drivers) such as prohibiting driving at night, during rush hour, on major highways, or long distances from home. Although such mandatory restrictions have shown promise as an approach for managing older driver safety, further research is needed to identify the overall safety benefits of such restrictions (Braitman, Chaudhary & McCartt, 2010; Hanson & Hildebrand, 2011) and which drivers are most likely to benefit from such restrictions (Nasvadi & Wister, 2009).

Purpose of Paper

As suggested above, appropriate self-regulation by older drivers might serve as a useful strategy that could not only benefit older adults directly, but also society at large. However, as noted by Hassan, King, and Watt (2015), "The question remains as to whether older drivers can accurately adjust their driving in response to their age-related declines"

(p. 26). The overall purpose of this paper is to report findings from an extensive synthesis of the literature on self-regulation of driving among older adults. The synthesis builds on earlier reviews of the literature by the authors (Molnar, 2013; Molnar & Eby, 2008), as well as extends literature findings on specific aspects of self-regulation (e.g., Molnar et al., 2013a, 2013b, 2014). Specifically, this report updates the set of publications reviewed by the authors, expands the set of factors thought to influence the self-regulation process and delves more deeply into some of them, and substantially reorganizes the presentation of information. It also presents a recommended framework for future research on self-regulation by older drivers.

The paper focuses on several topics related to self-regulation. First, it explores how self-regulation has been described, defined, and operationalized across the myriad of studies conducted in this area. This is important because the use of different constructs and measures of self-regulation may lead to very different findings. Second, it investigates the range of data collection approaches used by researchers. Third, it examines the current prevalence of self-regulation in the older driver population by identifying the extent and type of self-regulation found across the range of studies. Fourth, it describes the various sets of factors associated with self-regulatory behavior by older adults. Of interest were not only demographic factors such as age and sex, but also factors related to: health and functioning (both objective and subjective); awareness of and insight into functional declines; family and social support; and confidence, comfort with driving, and more general perceptions about one's capacities. Fifth, it identifies limitations of the current state of the literature on self-regulation. Finally, it lays out a framework for future research in this area to help address some of the challenges we currently face in interpreting study results and reaching meaningful conclusions that can be applied to the population of older drivers.

Methods

This section describes the methods used to critically review studies published in the peer-reviewed literature focusing on self-regulation among older drivers.

Scope of Review

The review built on work already done on this topic by the authors as well as brought in new and updated information on relevant topics. As a starting point for identifying the appropriate scope, a set of overall inclusion and exclusion criteria was developed. Inclusion criteria included: 1) published primary quantitative or qualitative studies reporting results in English; 2) studies including older drivers as at least part of the sample; and 3) publications from 2009 onward. This time period was chosen because we have conducted extensive reviews of the literature up to 2009 and have all the relevant publications up to that year (e.g., Molnar & Eby, 2008. Molnar et al., 2009). Therefore, for this synthesis, an extensive review was conducted from 2009 onward and appropriate articles from the previous reviews were included. Exclusion criteria included: 1) documents that express the author's opinion rather than presenting evidence based on scientific data; and 2) studies in which the research results did not appear valid due to insufficient sample size, confounding variables, and inappropriate data analyses.

Scanning and Screening for Available Documents

The search for relevant documents was conducted by first developing a set of search terms based on the authors' knowledge of the self-regulation literature and past reviews of this literature (e.g., Molnar, 2013; Molnar & Eby, 2008). The set represented combinations of three subsets: self-regulation related words (self-regulation, self-regulatory, avoidance, compensation, modification, restriction, reduction); driving related words (driving, driver, drivers), and aging related words (aging, ageing, aged, older, senior, elderly). The search terms were used to target key journal articles, technical reports, conference papers and proceedings, white papers, books, and other documents on the topic. Databases included TRID (Transportation Research Board), Scopus, DeepBlue, Google Scholar, UM-MIRLYN, and the UMTRI Library. Most European literature (that coming from SWOV, TRL, INRETS, VTI, and BASt) is now indexed in TRID, which incorporates the ITRD database (OECD's International Transport Research Documentation).

The document search process was necessarily iterative in that as appropriate articles were found, we used subject and key word terms in those articles to refine our search, as well as follow up on relevant references included in those articles. In addition, we made use of systematic reviews that have been done in this area or subsets of the area to help us tailor our search.

Retrieval and Organization

The reference management software package Zotero was used to manage the literature review. Using Zotero facilitated the identification, retrieval, and storage of reference and other bibliographic information because of its capabilities to: directly import bibliographic information from most bibliographic databases; search library catalogs and free databases

from within the software program itself; and organize PDFs of the full articles on the UMTRI server.

Synthesis

Collected articles and data were reviewed for appropriateness and those deemed appropriate (based on inclusion and exclusion criteria) were collected and organized, so that information could be synthesized for this review. We then integrated this synthesis into previous review findings as appropriate or in the case of new findings, summarized them in a meaningful way. Collectively, the synthesis presented here should provide a summary of the current research on self-regulation of driving by older adults, as well as discuss limitations, weaknesses, and/or varying perspectives on the research to date. The search for publications, using the search terms and databases identified earlier, yielded a total of 596 publications from 2009 onward. After initial screening, 100 were considered to be relevant and underwent a detailed review for this synthesis. In addition, 71 publications from pre-2009 were included in the synthesis

Results

The research on self-regulation of driving among older adults has increased significantly in the past several years, leading to corresponding increases in the scientific literature. A careful review and synthesis of this literature requires detailed attention to how studies define and operationalize self-regulation, as well as findings with respect to the extent and type of self-regulation, and the various factors that influence the process.

Definitions of Self-Regulation

The research literature on driving self-regulation generally describes self-regulation as the process by which individuals modify or adjust their driving patterns by driving less or intentionally avoiding situations considered challenging (e.g., Baldock, Mathias, McLean, & Berndt, 2006; Ball et al., 1998; D'Ambrosio, Donorfio, Coughlin, Mohyde, & Meyer, 2008; Molnar & Eby, 2008; Stalvey & Owsley, 2000). In particular, self-regulation is considered to be a strategy for compensating for declining health or loss of functional abilities that can compromise driving (e.g., Hakamies-Blomqvist & Wahlström, 1998; Sullivan, Smith, Horswill, & Lurie-Beck, 2011). In this context, older drivers' self-regulatory practices have been described as: "…compensation for age-related declines in abilities by reducing their annual mileage as well as regulating when and where they drive" (Dobbs & Dobbs, 2001, p. 101); making "…adjustments in their driving behaviour that adequately match changing cognitive, sensory, and motor capabilities" (Charlton et al., 2006, p. 363); and as a process requiring "…an awareness of physical, cognitive, and sensory limitations" (Sargent-Cox, Windsor, Walker, & Anstey, 2011, p. 898).

Underlying theses various definitions is the notion that drivers have some insight into and awareness of their declining abilities and self-regulate their driving to continue driving in some capacity – that is, for safety or related reasons, they either reduce their overall driving or avoid certain situations that are challenging for them such as driving at night, in bad weather, during rush hour traffic, in unfamiliar areas, on the freeway, and so forth (e.g., Baldock et al., 2006; Jones, Cho, Abendschoen-Milani & Geilen, 2011; Sullivan et al., 2011).

However, most studies of self-regulation have simply asked older drivers if they modify their driving (e.g., by driving less or avoiding certain driving situations) without delving deeper into their motivations for these modifications. Therefore, it is difficult to know if these modifications constitute self-regulatory behavior as it is commonly defined, or if they simply represent changes in driving patterns that have little or nothing to do with self-regulation. A number of reasons have been advanced for driving modifications unrelated to self-regulation, such as changes in preferences or lifestyles resulting in greater flexibility in scheduling trips or simply less need to travel under certain conditions (e.g., Ball et al., 1998; Blanchard & Myers, 2010; Charlton, et al., 2006; Hassan, King & Watt, 2015; Myers et al., 2008). Recent findings that younger drivers also engage in avoidance behavior (e.g., Gwyther & Holland, 2012; Moták, Gabaude, Bougeant & Huet, 2014; Naumann, Dellinger, & Kresnow, 2011) also support the assertion that driving avoidance is not always related to declining abilities associated with aging. Thus, even though these avoidance behaviors by younger drivers are often described as self-regulation, it can be argued that they do not