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Comparison of driving avoidance and self-regulatory patterns in younger and older drivers

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ABSTRACT

This study sought to ascertain whether both the avoidance of difficult driving situations and self-regulation (i.e., avoidance matched to one's cognitive abilities) are typical of older drivers. Older and younger drivers (mean ages 71 and 30 years, respectively) self-rated their avoidance of ten specific driving situations (e.g., driving at night, in fog). Both groups also self-evaluated their physical and mental health, while we administered general (Mini-Mental State Examination) and specific (Digit Symbol Substitution Test) cognitive assessments. The older drivers reported greater avoidance of all ten situations than the younger drivers did, although the effect size remained small. There were also more correlations between self-reported driving avoidance and both health-related perceptions and objective indicators of cognitive function among older drivers, suggesting that self-regulation is a strategy that is typical of this group. Results also showed that, with the exception of the cognitive function indicators, the factors under investigation (i.e., age, driving experience, health-related perceptions) underpinned the self-regulatory patterns in different ways, depending on the drivers' age group. Hypotheses regarding the underlying mechanisms, further factors of interest (including relevant neuropsychological tests), and alternative ways of measuring self-regulation are put forward.

1. Introduction

Mobility is key to maintaining social activities in later life (Taylor & Tripodes, 2001). Puzzlingly, as those drivers who are most prone to aging-related impairments like to point out, they boast the lowest crash rates (Langford, Bohensky, Koppel, & Newstead, 2008), at least as a population, until their annual mileage becomes extremely low (Langford, Koppel, McCarthy, & Srinivasan, 2008; see also O'Neill, 2012, for discussion). Some age-related visual and cognitive impairments are not only inevitable (e.g., Deary, Johnson, & Starr, 2010), but presumably interfere with abilities that are crucial for driving safety (Anstey, Wood, Lord, & Walker, 2005; DeRaedt & Ponjaert-Kristoffersen, 2001; McGwin, Owsley, & Ball, 1998; Selander, Lee, Johansson, & Falkmer, 2011). The issue worldwide is therefore how – and how accurately – older drivers adjust their driving to take account of their age-related impairments (Kowalski et al., 2012; Langford & Koppel, 2006).

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Many studies suggest that older drivers modify their driving according to these impairments, that is, they avoid those driving situations in which their impairments might expose them to an increased risk of accident. Whichever name this strategy goes under – *driving avoidance* (Vance et al., 2006), *self-restriction* (Naumann, Dellinger, & Kresnow, 2011) or, more commonly, *self-regulation* (Baldock, Mathias, McLean, & Berndt, 2006; Blanchard & Myers, 2010; Donorfio, D'Ambrosio, Coughlin, & Mohyde, 2009; Rudman, Friedland, Chipman, & Sciortino, 2006; Sargent-Cox, Windsor, Walker, & Anstey, 2011; Sullivan, Smith, Horswill, & Lurie-Beck, 2011) – older drivers do indeed appear to (i) drive less and less with age (Ball et al., 1998; Donorfio, D'Ambrosio, Coughlin, & Mohyde, 2008), and (ii) drive less at night and in fog as their processing speed decreases (Charlton et al., 2006; Gabaude, Marquié, & Obriot-Claudel, 2010). Arguably, when such adjustments mirror variations in cognitive function, they appear to be strategic, and are mostly intended to prevent accidents (DeRaedt & Ponjaert-Kristoffersen, 2000).

In some cases, self-regulation may also be based on other, rather emotionally loaded, factors such as confidence. For instance, older drivers have been found to avoid those situations in which they feel less confident, such as driving at night or at night in the rain (Baldock et al., 2006; Charlton et al., 2006). However, in contrast to the self-regulation that is based on cognitive function, avoidance associated with lack of confidence is potentially concerning. Drivers who are moderately or not at all confident of being a safe driver have been shown to be up to 1.94 times more likely to be involved in a crash than drivers who are very confident of being safe drivers (Oxley, Charlton, Scully, & Koppel, 2010). Whether or not self-regulation is safety-proficient therefore seems to depend on its underlying causes.

The strategy of self-regulation through avoidance of difficult driving situations has thus far been regarded as a characteristic of aging drivers (Donorfio et al., 2009; Schlag, 1993). Some doubt can, however, be cast on just how typical of older adults this strategy really is. It is argued, for example, in research on metacognition, that older adults' self-regulation and the accuracy of this self-regulation can only be defined when compared with that of younger adults (Hertzog & Hultsch, 2000). On a more macroscopic level, it is argued that self-regulation can only be regarded as accurate if it is age-adjusted, that is, if it takes age-related differences in cognitive abilities into account (Metcalfe, 2002; Metcalfe & Kornell, 2003). Yet, we currently know very little about self-regulation in younger drivers. It has been suggested that they declare driving avoidance (i) less than older drivers do (Naumann et al., 2011), and (ii) more than middle-aged drivers do (Gwyther & Holland, 2012). However, in these studies, driving avoidance reports were not correlated with any assessment (self-declared or otherwise) of cognitive function. Thus, in addition to considering older and younger drivers' driving *avoidance* (i.e., the amount of self-reported avoidance in different driving situations), our study aimed to investigate *self-regulation* (i.e., the link between the level of self-reported avoidance and several underlying factors) in both age groups.

With this aim in mind, we replicated the widely used self-report paradigm for the avoidance of those driving situations that are deemed to be difficult (Ball et al., 1998; Charlton et al., 2006; Kostyniuk & Molnar, 2008). Of the 24 situations described in the literature (for a review, see Horswill, Anstey, Hatherly, Wood, & Pachana, 2011; Sullivan et al., 2011), we chose to assess self-declared avoidance for 10 situations which, in our opinion, most typified the local (i.e., French) setting and infrastructure. Moreover, in addition to the currently investigated demographic and driving factors deemed to influence driving avoidance (age, sex, driving experience; Gwyther & Holland, 2012; Naumann et al., 2011), we assessed drivers' cognitive function using basic neuropsychological measures (e.g., Anstey et al., 2005), as well as drivers' own perceptions of their mental and physical health (e.g., Eby, Molnar, Shope, & Dellinger, 2007; Rapoport et al., 2013).

Our first prediction was that self-declared avoidance would be greater among the older drivers than among the younger ones (Naumann et al., 2011), but that the extent of this avoidance would differ according to the type of situation (Gabaude et al., 2010). Insofar as older drivers are said to particularly avoid driving in conditions of restricted visibility (i.e., at night or in bad weather; Molnar & Eby, 2008), we expected the older participants to avoid precisely these situations. Moreover, given the considerable heterogeneity in older drivers' self-reported avoidance, principally modulated by cognitive function (Vance et al., 2006), we expected any age-related differences to be weak.

Our second prediction was that self-regulation (i.e., the magnitude of bivariate Pearson's correlations between self-declared avoidance and age, driving experience, cognitive function, mental health and physical health) would also be greater in the older drivers than in the younger ones. This result-interpreted with caution-would confirm that self-regulation through avoidance is typical of older drivers.

2. Method

2.1. Participants

Initially recruited for a driving simulator study partly described elsewhere (a study proposing a new behavioral paradigm for investigating older drivers' self-regulation; Moták, Huet, Gabaude, & Bougeant, 2012), a self-selected, convenience sample of 26 younger (age range 26–35 years) and 91 older adults (age range 65–85) took part in this study (mean age = 30.19 vs. 70.58 years, $SD = 3.24$ vs. 4.54), $t(115) = 42.34$, $p < .001$, $d = 9.42$. All participants, recruited mainly via local newspapers, scored above 24 on the Mini-Mental State Examination (MMSE; Folstein, Folstein, & McHugh, 1975) and stated that they were in excellent or good physical and mental health, and did not take any central nervous system medication. They had been in possession of their driving license for at least 3 years, and drove between 5000 and 25,000 km each year. The sex variable was collapsed in all our analyses, as the male/female ratio did not differ across the two age groups, χ^2