Older drivers and rapid deceleration

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Abstract

We examined the relationship between older drivers' Rapid Deceleration Events (RDEs) and visual and cognitive function and driving confidence. Participants aged 75-94 years had their vehicle instrumented for 12-months. Processed accelerometer data identified >750milli-g RDEs. Regression modelling examined associations between RDEs and influential factors, with (i) weeks of monitoring and (ii) distance driven applied as exposure measures. Influential factors included measures of function and driving confidence at baseline and declines over 12-months. Older drivers with a decline in contrast sensitivity and those with lower baseline confidence were found to be at increased risk of involvement in RDEs per distance.

Background

Rapid deceleration has been used as an indicator of near crashes and, in studies including video footage, associated with driver error (af Wahlberg, 2008; Keay et al., 2013; Klauer, Dingus, Neale, Sudweeks, & Ramsey, 2009; Simons-Morton et al., 2009). During 2004-2013 in Australia, fatal crashes involving older drivers increased (BITRE, 2014). Particular concern exists for older drivers with poor or declining visual, cognitive and physical function (Anstey, Horswill, Wood, & Hatherly, 2012; Wong, Smith, & Sullivan, 2012).

Aim

We examined the relationship between older drivers' Rapid Deceleration Events (RDEs) and visual and cognitive function and driving confidence.

Methods

Participants were aged 75+ years and lived in suburban Sydney. Participants' vehicles were instrumented for 12-months with a Global Positioning System and accelerometer. Data processing identified RDEs above 750milli-g. Regression analysis examined associations between RDEs and influential factors, with (i) weeks of monitoring and (ii) distance driven applied as exposure measures.

Influential factors included baseline measures and clinically meaningful changes over 12-months. Contrast sensitivity assesses ability to distinguish an object from its background. DriveSafe/Driveaware evaluated visual attention and self-awareness of driving ability and functional limitations. Trails Making Test Part B assesses visual scanning, psychomotor and executive function. The Driving Confidence Questionnaire assessed confidence during difficult driving situations (0-100 score).

Results

Valid data was recorded for 97% (177/182) of vehicles. Participants were aged 75 to 94 years (median=80), 64% (114/177) were involved in at least one RDE, and 17% to 29% experienced a

decline in cognitive and/or visual function during the year. Multivariate modelling per distance driven found RDEs increased by 88% for participants with a decline in contrast sensitivity adjusted for baseline contrast sensitivity (IRR=1.88, p=0.04, 95%CI=1.05-3.36), and 17% for each 10 point lower baseline driving confidence score (IRR=1.17, p=0.003, 95%CI=1.05-1.29). No factors were predictive of involvement in RDEs adjusted for weeks of monitoring.

Discussion

We found older drivers with declining contrast sensitivity and lower driving confidence have greater risk of these events when they are on the road. Associations between poor contrast sensitivity and crash risk have been reported elsewhere (Guo, Fang, & Antin, 2015). Previous research found older drivers only demonstrate increased crash involvement when distance driven is taken into account and raised particular concern for crash involvement for older drivers with lower mileage (Langford et al., 2013). We are seeing a similar relationship for RDEs, and analysis including this cohort has shown confidence reduces with age and functional decline (Coxon et al., 2015), so we may also be demonstrating 'low mileage bias'.

Research examining 350+ milli-g RDEs during a week from 1425 drivers 67-87 years found those with lower mileage were more likely to be involved in RDEs per distance (Keay et al., 2013). However, drivers involved in RDEs had better vision and cognition compared to those not involved. Differences in findings could be related to RDE thresholds, sample sizes or monitoring periods.

Conclusion

Older drivers who experienced a decline in contrast sensitivity and those with reduced confidence were found to be at increased risk of RDEs.

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