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Abstract

Research indicates that older drivers have an increased risk of being seriously or fatally injured if they crash. However, it is important that older drivers do not cease driving prematurely because driving enables them to remain mobile, which is important for their independence, health and well-being. Older drivers who live in rural or remote areas are of particular interest because the nature of their driving environments may further increase their risk on the road and restrict their mobility. In terms of risk, certain factors that are more common in rural driving environments, such as roads with high speed limits, may contribute to an increased likelihood that older rural drivers will be seriously or fatally injured if they crash, compared to older urban drivers. With respect to mobility, the longer distances that older rural drivers have to travel to reach their destinations, compared to older urban drivers, may restrict their ability to undertake everyday lifestyle activities, particularly those activities that are discretionary in nature (e.g. social activities).

The aim of this thesis was to examine the safety and mobility of older drivers who live in rural areas of South Australia, compared to their urban counterparts. This was achieved through five independent studies. Studies 1 and 2 involved the analysis of crash, serious injury, and fatality data for drivers of different ages from both rural and urban areas of South Australia. Study 1 found that rural drivers aged 75 years and older were more than twice as likely to be involved in crashes that resulted in a serious or fatal injury than urban drivers of the same age. Study 2 found that certain environmental factors - undivided, unsealed, curved and inclined roads, and roads with a speed limit of 100km/h or greater - were more likely to be present in the crashes of older rural drivers than those of older urban drivers and increased the chances that the driver would be seriously or fatally injured. In particular, crashing on a road with a speed limit of 100 km/h or greater produced the largest increase in the risk of serious or fatal injury to the driver.
Study 3 involved an examination of the perceptions of 170 drivers (aged ≥ 75) from rural and urban areas of South Australia regarding: the importance of driving, their access to alternative transportation (e.g. public transport), and the degree to which they self-regulate their driving. It was found that rural participants viewed their driving as being more important than did their urban counterparts and believed that they had fewer alternative transportation options available to them. However, they did not differ on various indices of self-regulation, namely: avoidance of difficult driving situations, reductions in amount of driving and willingness to stop driving. Thus, older rural drivers did not appear to be restricted in their ability to self-regulate because of greater perceived driving importance or limited alternative transportation.

Prior to investigating the driving mobility and exposure of 56 drivers (aged ≥ 75) from rural and urban areas of South Australia, using GPS data loggers and telephone-based travel diaries, the suitability of these methods of data collection was firstly evaluated in Study 4. The participants (who were a sub-sample of the 170 drivers in Study 3) had their driving monitored for a period of one week. Subsequent interviews regarding the data collection process were also undertaken with a subset of 16 participants. It was found that these methods of data collection provided a broad range of accurate information relating to driving exposure (e.g. distance driven, time spent driving, number of trips, travelling speed, road characteristics) and travel patterns (e.g. discretionary and non-discretionary activities, driving routes) for all participants. Furthermore, the participants who were interviewed provided favourable feedback regarding the data collection process.

The data collected for Study 4 were used in Study 5, in order to assess whether older rural drivers are more restricted in their everyday driving mobility, and whether they differ in their exposure to risk while driving, compared to older urban drivers. It was found that, in terms of mobility, rural participants drove further over the week than urban participants, but did not differ in the number of trips that they made or the number that were for discretionary
or non-discretionary activities. With respect to risk-exposure, rural participants were exposed to fewer intersections (potential conflict points) per kilometre\(^1\) and minute driven than urban participants, but drove further and for longer periods on roads with speed limits of 100 km/h or higher and at GPS-measured speeds of 100 km/h or faster.

Overall, the findings suggest that living in rural areas affects the driving safety of older adults, such that the rural driving environment increases the likelihood that they will be seriously or fatally injured in the event of a crash. Importantly, their day-to-day driving mobility is not affected by living in rural areas because they undertake as much driving, and as many activities through their driving, as older urban drivers. Therefore, the challenge for the future is to reduce the risk of serious and fatal injury for older rural drivers without reducing their mobility and, consequently, quality of life in the process. This research does suggest some means by which safe and sustainable mobility may be achieved for older rural drivers, including: modifying the rural driving environment (e.g. decreasing speed limits) and encouraging the use of newer vehicles, which provide better protection in a crash.

\(^1\) Australian/UK English spelling is used throughout this thesis.
Declaration

I, James Thompson, certify that this work contains no material which has been accepted for the award of any other degree or diploma in my name in any university or other tertiary institution and, to the best of my knowledge and belief, contains no material previously published or written by another person, except where due reference has been made in the text. In addition, I certify that no part of this work will, in the future, be used in a submission in my name for any other degree or diploma in any university or other tertiary institution without the prior approval of the University of Adelaide and where applicable, any partner institution responsible for the joint award of this degree.

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List of Publications

Publications are listed in order of appearance in this dissertation


Statements of the Contributions on Jointly Authored Papers

Chapter 3
Title: Older drivers in rural and urban areas: Comparisons of crash, serious injury, and fatality rates
Co-Authors: M.R.J., Baldock, J.L., Mathias, L.N., Wundersitz
Contributions: M.R.J. Baldock and I were responsible for the study inception. I was solely responsible for the study design, methodology (which included data extraction, statistical analyses and data interpretation), and manuscript preparation. All three co-authors acted in a supervisory capacity during all stages of this research and manuscript preparation.

Chapter 4
Title: An examination of the environmental, driver and vehicle factors associated with the serious and fatal crashes of older rural drivers
Co-Authors: M.R.J., Baldock, J.L., Mathias, L.N., Wundersitz
Contributions: M.R.J. Baldock and I were responsible for the study inception. I was solely responsible for the study design, methodology (which included data extraction, statistical analyses and data interpretation), and manuscript preparation. All three co-authors acted in a supervisory capacity during all stages of this research and manuscript preparation.

Chapter 5
Title: Do older rural drivers self-regulate their driving? The effects of increased driving importance and limited alternative transportation
Co-Authors: M.R.J., Baldock, J.L., Mathias, L.N., Wundersitz
Contributions: M.R.J. Baldock and I were responsible for the study inception. I was responsible for the study design, methodology (which included participant recruitment, data
collection, statistical analyses and data interpretation), and manuscript preparation. All three co-authors acted in a supervisory capacity during all stages of this research and manuscript preparation.

Chapter 6
Title: The benefits of measuring driving exposure using objective GPS-based methods and subjective self-report methods concurrently
Co-Authors: M.R.J., Baldock, J.L., Mathias, L.N., Wundersitz
Contributions: M.R.J. Baldock and I were responsible for the study inception. I was responsible for the study design, methodology (which included participant recruitment, data collection, statistical analyses and data interpretation), and manuscript preparation. All three co-authors acted in a supervisory capacity during all stages of this research and manuscript preparation.

Chapter 7
Title: A-GPS based examination of the mobility and exposure to risk of older drivers from rural and urban areas
Co-Authors: M.R.J., Baldock, J.L., Mathias, L.N., Wundersitz
Contributions: M.R.J. Baldock and I were responsible for the study inception. I was responsible for the study design, methodology (which included participant recruitment, data collection, statistical analyses and data interpretation), and manuscript preparation. All three co-authors acted in a supervisory capacity during all stages of this research and manuscript preparation.
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