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A REVIEW OF THE IRISH ROAD NETWORKS INFRASTRUCTURE BARRIERS TO OLDER PEOPLES MOBILITY: CURRENT POLICY AND LITERATURE

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Abstract

Over the next thirty years in Ireland, the population aged over 65 is estimated to grow considerably. The maturation of the 'baby boom' generation will transform the demographics of the country. In our current and future aging society, transport and mobility are key factors in facilitating active aging. In general, older people now travel more than before, have higher levels of car ownership and are more likely to continue to drive for longer.

Modal shift to more sustainable modes of transport is simply not practical for older people living in areas with limited public transport. Older people, who are suffering from ailments, will tend to cease walking long before they cease driving. Maintaining mobility is crucial in later life. The lack of transport alternatives, in the short term, can be bridged by enabling older people to continue to drive safely for longer. A need exists for alternative travel modes and will become more pertinent given the increase in the number of older people who can no longer drive but will still require mobility.

While older drivers have fewer reported crashes per capita in developed countries, extreme driving conditions place excessive demand on their abilities compared to younger drivers. A reason for older drivers over representation in certain types of crashes can be contributed to road design which follows standards based primarily on measures of performance of young males. By improving the road network for older people it will encourage and assist them to stay mobile for longer and improve safety for all other users.

This paper identifies the deficit in the Irish road networks design and research in catering for the older driver through a review of the research literature and highway design policy and through an interrogation of collisions involving older drivers identifies the key highway design and behaviour indicators that contribute to older driver collisions in an Irish context.

The issue for road safety will be whether the increase in older driver exposure is offset by the improvement in design, training and alternative travel mechanisms. Monitoring and future research of these components will be crucial to determine the success of these measures in assisting older driver's safety and longevity on the network.

1. Introduction

This paper examines the current 'problem' of older drivers negotiating Irish roads, including the types of collisions they are involved in and investigates the direction of future research in Ireland to assist older drivers mobility by improving road safety. Within this paper, older people are defined as people aged over 65. This grouping of people is complex as everyone ages differently, however, 65 is chosen as it's the chronological age of retirement from the workforce in Ireland.

Aging Demographics

Presently in the Republic of Ireland, 11.86% of the population is aged over 65 [1]. Figure 1 shows an increase in the absolute number of older people but historically this age cohorts percentage share of the total population has remained relatively unchanged. This is low compared to many other countries within the EU where some European countries, Germany and Italy, already have more than 20% of their populations aged 65 and over [2].

In Ireland, this trend is set to change. By 2031, the population aged over 65 in Ireland is expected to grow to 21% of the total population [3]. This is similar to forecasts for this segment of the population for member countries of the Organisation for Economic Co-operation and Development (OECD) which comprises of countries such as Ireland, Australia and the United States. It is predicted that by 2030, one in every four people in the OECD countries will be aged over 65 [4]. This increase in older people is due mainly to the maturation of the 'baby boomers'; the fall in the birth rate and the reduction in mortality at older ages.

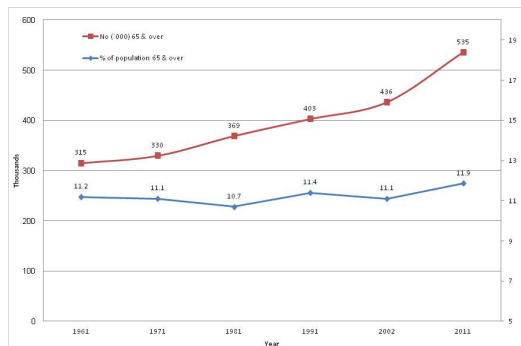


Figure 1: Older People aged 65+ in Ireland, 1961 – 2011: number and % of population [1]

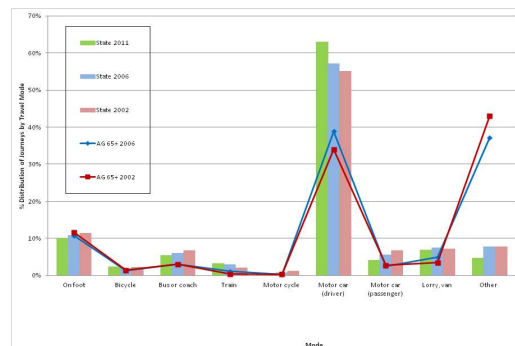


Figure 2: Older People aged 65+ in Ireland: Mode Share, 2002, 2006 and 2011 [1]

This shift in demographics will have serious implications on many public services that older people rely on, such as health care and the ability to access these services providers will be crucial. It is now that transport policies need to be reviewed and modified to reflect this change in demographics.

Licenses and Mobility Shift

In Ireland, car (driver) is the preferred mode of transport for the over 65 age group, accounting for 39% of all journeys in 2006 [5]. Over the last decade, the modal share by car has increased for both the over 65 age group and on a national basis. Figure 2 demonstrates how the over 65 age group and Irish society are becoming increasingly mobile and dependent on car use.

In 2011, 74.26% (397,560) of people aged 65 and over in Ireland hold a driver's licence. This is an increase of 50.11% of driver licence holders in this age cohort since 2003 compared to a 28.36% increase in the 21-29 age category. Data generated from the Census [5] on gender indicators highlight the considerable gender difference in relation to driving with only 56.95% of woman aged over 65 holding a driving licence compared to 95.03% of men.

Rural respondents to the National Travel Surveys [6] are noted as being highly dependent on their car with 83% of respondents either owning or having regular use of a vehicle compared with 69% of urban dwellers; they also make fewer journeys but travel further than urban respondents.

Rural respondents hold a higher percentage of driving licences (86%) compared to their urban counterparts (75%) and only 51% of rural respondents have access to a local public transport service compared with 95% for urban dwellers. In general, older people now have higher levels of driving licences, car dependency- particularly in rural areas and are more likely to continue driving for longer [7] [8] [9].

In addition, older people who are suffering from ailments will tend to cease walking long before they cease driving [4]. While the future cohort of older people are likely to be more mobile and healthy, evidence suggests [10] older people are less inclined to walk and more inclined to drive.

Reference [11] notes the high levels of car dependency means that governments have felt less need to provide public transport, although lack of public transport is what has, in part, lead to high car dependency rates in the first place. This acute dependency heightens the older drivers' awareness of the importance of retaining driver privilege to access their locality.

In the absence of any real alternatives to the private car it is imperative to enable older people to continue to drive for as long as possible. The benefits of car use to older people are independence, well-being and mobility. Driver cessation threatens these attributes and leads to social isolation, depression [12] and general decline in health [13].

The lack of transport alternatives, in the short term, can be bridged by enabling older people to continue to drive safely for longer. The issue for road safety will be whether the increase in older driver exposure is offset by the improvement in design, training and alternative travel mechanisms. This subject will require further research and monitoring in the coming years in Ireland.

2. Older Driver Collisions

In Ireland, older drivers have fewer crashes than younger people. Between 1996 and 2009 the over 65 age category accounted for 7.01% of all car driver fatalities on Republic of Ireland roads and ranked 6th in terms of car driver fatalities per age categories [14]. By comparison the 21-29 year old age category which is the age group most at risk for fatal car driver collisions accounted for 30.77% of all fatalities.

Figure 3 illustrates the general downward trend in car driver fatalities for all age groups. Since 2001, much success has been achieved in reducing road fatalities particularly with targeted campaigns towards the 21-29 age group.

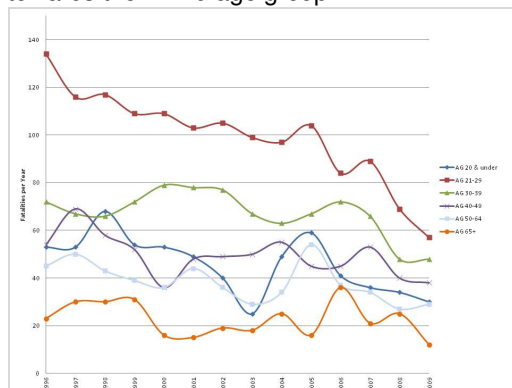


Figure 3: Older People aged 65+ in Ireland: Car Driver Fatalities per Age Group 1996-2009 [14]

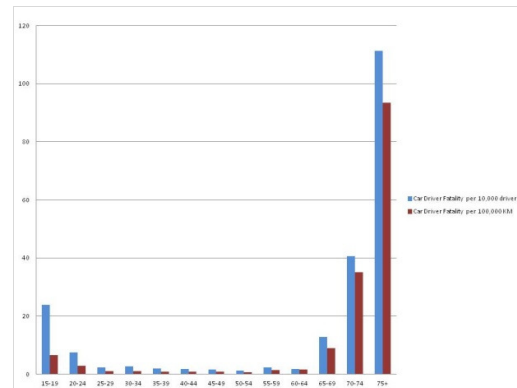


Figure 4: Older People aged 65+ in Ireland: Car Driver Fatalities by Age Group relative to Driving Licence population & Mileage Driven [1, 5, 14]

Statistically, this level of car driver fatalities in the over 65 age group does not constitute a major road safety concern when compared to other age groups so why should road designers and policy makers be concerned about the older driver?

In 2011, 15.85% of all car driver fatalities on the Republic of Ireland roads were by drivers aged 65 and over [15]. In terms of ranking car driver fatalities per age category, the over 65 age category in 2011 ranked 4th where, again, the 21-29 year old age group ranked 1st.

Furthermore, when the number of fatalities in an age group is related to the number of drivers in that age group and taking into consideration that people in the 65 to 74 age category travel 47% less kilometres per week than younger drivers [6] - the crash rate increases.

Figure 4 demonstrates per 10,000 driving licence population and distance travelled, the over 65 age group are more likely to be killed when involved in a collision as a driver.

There is a degree of low mileage bias as older drivers tend to have a lower yearly mileage. The bias refers to the likelihood that risk per mile/kilometre is higher at lower yearly driving distances for all ages [1, 5, 14 & 16].

Taking account of the low mileage bias, fatal collisions among all age groups are declining, however, the extent of the decline amongst the over 65 age cohort is considerably **less** when compared to other age groups.

Frailty Bias

The frailty bias maintains that if older people are involved in a crash they are more likely to experience adverse outcomes due to their increased vulnerability to injury [17, 18, 19, 20, 21 and 22]. It has been reported that older people are between two and five times more likely to be killed or suffer a serious injury as a result of any road accident than younger people [23].

An interrogation of the Irish Road Safety Authority's (RSA) Road Collision database from 1996 to 2009 [14] revealed that for all collisions involving drivers in the 70-79 and 80 & over age categories, 7.56% and 11.42%, respectively, of those collisions were fatal. This is in marked contrast to the fatal driver collision average of 6.33% out of the total driver collisions for drivers in all other age categories. This reveals that older drivers are more likely to be killed when involved in an accident than their younger counterparts.

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The rate of casualties among older drivers is estimated, by 2022, will decrease but not at the same level as among younger drivers, therefore, leading to older drivers in the future expanding their proportion of crashes [24].

Frailty was determined [25] to be the key factor for elevated death rates in crashes that involve older drivers as opposed to their rate of crash involvement.

Older Driver Collision Characteristics

While older drivers have fewer reported crashes per capita, extreme driving conditions place a more excessive demand on their abilities when compared with younger drivers; this is particularly the case when older drivers approach a complex intersection [26, 27, 28 and 29]. Intersections pose the greatest risk of crash on the road network to drivers, particularly the older driver as they permit possible multiple points of collision with other road users. Collisions at intersections often involve high speed, reduced reaction times and a lack of adequate in-vehicle crashworthiness opportunities [30].

Not only are elderly drivers more involved in multi-vehicle crashes at intersections but they are also more frequently responsible for these accidents due to errors in perception, judgment, decision making and reaction time [31]. A reason for older drivers over representation in certain types of crashes can be contributed to road design. The road transport systems have been built in accordance to standards based primarily on measures of performance of young males [32].

Analysis of the RSA Road Collision database [14] concurs with international research that older drivers are more likely to be involved in a fatal or serious collision at a complex intersection. Fatal collisions at complex intersections accounted for 2.70% for all fatal driver collisions for the over 80 driver, in comparison this type of fatal collision involving a 21-29 year old driver accounted for 1.22% of the total fatal collisions for this younger age group. The high crash rate risk associated with the low distance travelled by older drivers can be partially explained by older drivers more likely to use local urban roads with more 'conflict points' such as intersections, compared to high mileage drivers who are more likely to use motorways and multi-lane divided carriageways with limited access [33 and 34]. Urban travel is more likely to result in crashes [35].

Since 2003, Ireland's motorway network has extended significantly and by early 2011 16.63% of the national road network comprised of motorway compared to 3.25% in 2003 [36]. It has been documented that older drivers do avoid driving on motorways [37] and this relatively new road type in Ireland may further contribute to older driver's avoidance of using this section of infrastructure and consequently increase their exposure on urban roads.

Functional Limitations

Research on older drivers has identified the limitations of the older driver due to the aging process and how these limitations affect driving ability. As a result of these limitations the risk of a crash and/or involvement in a crash by the older driver to themselves and to other road users has been exposed. However, these limitations which impair driver skill have a minor contribution to the older driver fatal crash risk much of which is due mainly to the 'frailty bias'.

When the older drivers realises that their deteriorating health is impacting on their driving technique they modify it so that they can continue to drive, this is termed 'Self Regulation' [38]. They will continue to modify their driving method to meet their changing abilities [49] Cessation of driving is avoided until absolutely necessary, therefore, by adaption, such as, by reducing the length of trips made and stopping driving at night or in peak hours, they can prolong their driving ability. Recent research [39] has indicated that the level of self regulation and its effectiveness is not working as well as it should.

Evidence is emerging that the 'oldest old' i.e. the drivers aged 80 and over are less safe than other age groups [40] and therefore self regulation guidance and assistance is required to enable this cohort of drivers to continue to drive safely. However, it is important to note that the majority of drivers would have already ceased driving prior to their 80s.

3. International Policy and Research

Ireland's transportation policy, like many other developed countries, is encouraging a modal shift to more sustainable modes of transport to reduce greenhouse gases and ease congestion in urban environments, then why should the older generation be encouraged to continue to drive? The current format and operation of public transport, particularly in rural areas, simply can't offer the same benefits as a car. Many older people still live in the same houses which were suitable to them when they had full personal mobility, however, with reduced mobility these houses will become isolating. Many houses particularly in rural Ireland are built in locations that are only suitable for car users. Over the years, attachment to the local community and affinity to the local area is formed and there is a reluctance to move to more accessible areas. A loss of activity and social interaction heightens the feeling of a loss in independence and leads to depression. Restricted mobility and lack of access to transport are regarded as key problems for older people wherever they live. However, in rural areas the greater distance between peoples' homes and basic services may exacerbate such disadvantage [41]. As a result, access to a car is often the difference between receiving or not receiving services. Maintaining mobility is crucial in later life.

While older drivers do have fewer collisions than most other age groups, they are more likely to be killed or seriously injured if involved in a collision due to their increased frailty [40]. In addition, there are questions to be answered on the minimal decline in fatalities in recent years when compared to other age groups rapid decline in fatalities. Road safety advancement by assisting older driver's mobility will reduce older drivers' crash involvement. The aging of the population is intensifying and has not gone unnoticed, with numerous countries responding by introducing a number of initiatives both in terms of research and actions which are worth briefly reviewing at this point in Table 1 below.

Table 1 International Older Driver Policy and Research

Country	Policy Objectives	Initiatives targeted at Older Drivers
Australia	Australian National Road Safety Strategy 2011-2020 Safe System approach to road safety improvement whereby <i>"No person should be killed or seriously injured on Australia's road"</i> by 2020 [42]	<p>A best practice framework for the assessment of older drivers' fitness to drive.</p> <p>Alternative mobility options for older drivers will be promoted through local government agencies.</p> <p>Progress of older driver fatalities will be monitored.</p>
United States of America	National Highway Traffic Safety Administration (NHTSA) established <i>"...a comprehensive research and demonstration program to improve traffic safety pertaining to older drivers."</i> [43]	<p>Provide information and guidelines to people who can influence older drivers.</p> <p>Improve the scientific basis of licensing decisions.</p> <p>Conduct field tests to assess the safety benefits and mobility impacts of programs.</p> <p>Assess the value and improve the safety potential of driver retraining courses.</p> <p>Conduct other activities to accomplish the objectives of this section.</p>
United Kingdom	The UK Department of Transport (DOT) vision for Road Safety include: Improving road safety together - Empowering local citizens and local service providers; Education – developing skills and attitudes; Targeted enforcement and sanctions [44].	<p>The UK DOT aims to support vehicle technology in protecting the vulnerable drivers in collisions, particularly the older female driver.</p> <p>Continue to research the difference in injury mechanism and mitigations for groups such as older people.</p> <p>Developing the necessary skills and attitudes to stay safe on British roads will range from resources offering advice, choice and training for older drivers.</p>

It is interesting to note that the UK DOT recognises and states that this is not practical for everyone to use sustainable forms of transport and specifically states this difficulty for older people living in areas with limited public transport where car travel helps facilitate continued independent living amongst the ageing population [44].

International research and action initiatives are focused on understanding the older driver problem and accurately assessing their ability to continue driving. The need for alternative travel modes is highlighted and will become more pertinent given the increase in the number of older people who can no longer drive but will still require mobility.

4. Irish Policy and Future Research

It is recognised that risk taking driving behaviour such as drink driving [45] and speeding account for a bigger proportion of the total road traffic fatalities in Ireland and much success in reducing fatalities has been had as a result of campaigns to target these users who tend to be also in the 17-35 year age category. However, to date, policy regarding the older driver has largely been neglected. The following Table 2 briefly outlines the current position of policy in relation to older drivers in Ireland.

Table 2 Irish Older Driver Policy and Research

Country	Policy Objectives	Initiatives targeted at Older Drivers
Ireland	<p>In 2008, the Road Safety Authority (RSA) of Ireland issued a consultation document on 'Fitness to drive' to invite input from stakeholders on current fitness to drive policy and procedures and to inform recommendations on development of policy for the future. To date, no policy has been published.</p> <p>The National Roads Authority (NRA) which is the agency responsible, under the Roads Act 1993, "...to secure the provision of a safe and efficient network of National roads" [46] is involved in ongoing Road Safety Research. To date no research has been conducted in direct relation to the older driver.</p>	Promote and maintain mobility and independence of drivers.
		Support and assist medical professionals in assessing fitness to drive.
		Maximise road safety for all road users.
		Promote the appropriate use by drivers of specialist training and technology.
		Ensure that driver training and testing services are accessible and appropriate.

Irish road safety policy has tentatively begun to investigate the process of retention of driving licences by older drivers which is similar to steps taken by other countries. Many of the actions taken aboard include a focus on older driver education and information. A review of current action and intervention programmes should be undertaken of the various Irish regional and local authorities and following this process, future research and action plans to be identified to address deficits.

To guide activity (and research) to accommodate older drivers, a tool is required, to identify locations where a concentration of factors negatively impacting older people's mobility including ability to drive, will collide. The identification and classification of these factors and areas will enable the development of specific strategies to improve older people's mobility and also older driver's longevity on the road.

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