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Chapter 9: Old Driver Needs and Issues: Using Grounded Theory to Elicit the Driving Needs of Older People

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Running header: Older driver needs and issues.

Abstract

The ageing process tends to impact negatively on driving ability and behaviour, increasing the likelihood of accidents. Traditionally, research tends to have been top-down and as such misses the needs, motivations and attitudes of the drivers themselves. This research worked in-depth with a small number of older drivers using a grounded theory approach to elicit their needs and requirements with regards to the driving task. It identified a number of issues that previous research had highlighted, including shortened reaction times, increased fatigue and problems with glare but in addition emphasised some novel issues, including marinating the vehicle speed at a consistent level and issues with distraction. The role new technology has in meeting such needs is briefly discussed.

Key Words

Needs and requirements; ageing; driver behaviour; technology; grounded theory

Introduction

Driving is a complex task which requires many interlinking cognitive, perceptual and physiological processes (McKnight and Adams 1970). Changes in these processes related to the ageing process can make the driving task more demanding increasing the likelihood of driver involvement in a road traffic collisions accident (DfT, 2001). Although older drivers do not present an excessive risk to other road users, there is a slight increase in the average number of accidents per mile driven for over 60s which increases the older the individual gets (Hewson, 2006). Older people may engage in compensatory behaviour mitigating negative effects of ageing, such as avoid driving at night, in adverse weather conditions, in rush hours and on unfamiliar roads (Fildes et al, 1994). The ultimate sacrifice is to stop driving altogether. Although there is much variation, the average age for giving up driving in the UK is 72 years (Rabbit et al, 1996). Giving-up driving and the associated loss in mobility is strongly correlated with an increase in depression and loneliness (Fonda, Wallace & Herzog, 2001; Musselwhite and Haddad, 2007). Although usually some physiological and cognitive impairment leads the individual to have to give-up driving, older individuals are often over-anxious about the driving task and tend to give up driving of their own volition, sometimes when little or no physiological or cognitive impairment is seen (Monterde I Bort, 2004). Previous research into older drivers has a number of limitations (see also Musselwhite, 2004). For instance, there is a tendency to treat older drivers as one homogenous group, rather than look at an idiographic level for differences between drivers. Research has tended to be of a top-down approach which is led by technicians and researchers. As such not much is known about older driver's needs, opinions, perceptions and attitudes towards driving.

Methodology

Philosophical Base

A modified grounded theory approach was adopted, where participants become co-researchers and participate throughout the research process (Strauss and Corbin, 1998; Glaser, 2001). This approach suits the nature of generating and developing knowledge and meaning from a wide variety of opinions and attitudes, without doing an injustice to their diversity and depth. Therefore, a researcher does not begin with a preconceived theory in mind, rather crafting theory from the rich collection of knowledge. The aim of grounded theory is to explain the knowledge from whence it came (Glaser, 2001).

Participants

This project used the same procedure and sample as is found in chapter 5. This project worked closely with 26 individuals (18 male, 8 female) with ages ranging from 68 to 90 years old (with the mean being 75 years old) . All had a current driving licence and owned, or had access to, a car. Participants were recruited from Dorset, a largely rural county in the South of England with a large proportion of older people. On average, they drove 109 miles per week, ranging from 20 to 400 miles. This compares to the national statistics on driving in the UK; older drivers (aged 65 and over) drive around 114 miles per week on average (DfT, 2016). Typically the participants made 11 journeys a week, which is identical to the 11 journeys per week cited nationally (DfT, 2016).

Procedure

To gain an in-depth understanding of driver needs and issues, four waves of data collection took place. Participants were invited to an initial (wave 1) focus group, where they also completed a background details questionnaire and then took part in a telephone interview (1-2 weeks after the first focus group) and completed a driver diary (on 3-4 weeks of driving between focus groups). They were invited back to the wave 2 focus group at the end of the research process, approximately one month after the initial group meeting. As such the procedure was iterative and began with very open-ended exploratory questions which were gradually refined in light of key findings. Participants were divided into three focus groups based on proximity to where they lived – group 1 (urban area) and 2 (rural area) had seven participants and group 3 (semi-urban area) had 12.

The focus groups lasted around 1½ hours and were recorded. Wave one of the focus group was semi-structured, so that the needs and issues raised came from the participants themselves, in line with the grounded theory approach. Wave two of the focus groups involved scenarios and video-clips of driving situations involving issues highlighted by the participants in wave one including weather and lighting - bright sun, rain, dark, poor light; issues with road conditions - right hand junctions, roundabouts, large scale congestion, signage and passing cyclists. Semi-structured telephone interviews, lasting approximately 30 minutes re-visited driving needs that were discussed in the wave 1 focus groups and assessed barriers to meeting such driver needs. A *pro-forma* driver diary was completed by participants who were asked to record details of each trip, its purpose and any particular issues or problems that arose during the trip and how they were overcome.

Participants were encouraged to complete their driver diary immediately after a journey creating a focused response on such issues.

In order to check for integrity and trustworthiness, triangulation and reflexivity were employed throughout the research. Triangulation was shown through the iterative approach which used four

different methods of data collection focussing on similar issues. Consistency and difference between and within-individuals were captured during analysis and discussed with participants at the next data collection point. In addition, two researchers were involved in analysis. Reflexive research notes were made by each researcher during data collection. Data analysis was carried out by both researchers and compared for consistency (which were reported) and contention (which were further discussed with participants).

Data Analysis

Data analysis ran concurrently with data collection to aid the iterative process. Reflexive notes made by researchers were combined with exact transcriptions of the data. A thematic analysis was employed to break-down and re-build the data using a process of Constant Comparative Analysis (Glaser, 2001; Goetz and LeCompte, 1981; Janesick, 1994; Lincoln and Gruba, 1985). This produced a summary of the data which is then addressed for similarities, connections and difference within the data.

Findings and Discussion

Helped by the inclusive methodology, participants were honest about aspects of the driving task participants found difficult and articulated where they thought ageing was a factor. The key areas of issues are detailed below, and are: external distractions, maintaining a constant speed at the speed limit, fatigue, reaction time, glare and luminance.

External distractions

Participants cited the abundance of street furniture, including road signs, event signs and road-works as a big distraction. They felt signs could be placed in inappropriate places, such as immediately at a junction or in an area where other tasks were taking place. They also felt that the language used in road destination signs to be confusing and lacked continuity. Furthermore, signs that are not a priority to the driving task sometimes cause distraction. Previous research suggests that problems with sign placement, size and clarity is a common problem for many drivers, especially older drivers (OECD, 2001). Kline, Ghali and Kline (1990) suggest that iconic signs are favoured by all age groups and were better understood at a shorter distance than text based signs, this was markedly true for older

drivers. In addition, older people need to be closer and need longer to see the signs in order to process the information (DfT, 2001). This can perhaps be explained through external and internal interacting factors. Externally, there is possibly too many inappropriate signs ill-placed on roads in the UK. The clutter of street furniture has been well-documented from an aesthetic and a safety point of view (Hamilton-Biaille and Jones, 2005). In addition, age-related changes in eye-sight coupled with a change in cognitive processing means signs take longer to be read, interpreted, processed and acted upon. In the UK, there are guidelines for signage from the DfT (HMSO, 2002) but more stringent guidelines based on evidence may help make signage less of a problem for all drivers. In addition, technology that displays appropriate signage in-vehicle may help, as the sign could be prioritised and shown continuously for a longer period of time. However, such systems may have the reverse effect of increasing workload if they are not designed carefully; the positioning of the vehicle display and the way the information is provided is crucial in success (Pauzie, 2003). Participants tended to show favourable attitudes towards such technology.

Maintaining a constant speed at the speed limit

Older people often discussed the problem with maintaining a constant vehicle speed. They reported a variety of reasons that caused this, including unawareness of the speed limit (either due to the seemingly random fluctuations of the limits and/or poor signage), physiological issues (keeping to speed was difficult for those who had stiff leg muscles as keeping the accelerator at the required level could becomes problematic); but most common was a lack of knowledge about the current vehicle speed. Looking down at the speedometer and then back up and outside can cause problems stemming from accommodation, where the eye is adjusting focus between outside the vehicle and closer-up inside the vehicle on the speedometer. Accommodation of the eye begins to take longer as people get older (Burd, Judge and Flavell, 1999). Furthermore, processing information takes longer, so that the speedometer has to be looked at for a longer time. Previous, mainly top-down, research has not uncovered this as a need for older drivers, however parallel participatory research to this project has found similar issues amongst older people (Wicks, Keith and Bradley, 2006). This leads to the idea of introducing extra feedback on current speed-levels to the driver. As such investigations into new technology that involve auditory or haptic feedback seem appropriate and indeed were welcomed by the participants. In addition, re-appraising the speedometer and its placement may be necessary.

Fatigue

An increase in tiring early in a drive was an issue for the participants. Tiredness seemed to come on quicker and have a more dramatic effect on them than when they were younger. This corresponds

with previous research (see DfT, 2001 and OECD, 2001). Participants were aware that tiredness definitely led to poorer driving, particularly judgment and decision-making. However, they mentioned that they had a good level of self-awareness about the onset of tiredness and fatigue and were able to take extra breaks to compensate. Older drivers felt they had greater self-awareness of tiredness than technology would be able to predict. Research seems to agree: self-awareness of fatigue is more reliable than technology that can detect fatigue (DfT, 2006b).

Reaction time

A key theme was the reaction time of older drivers. Participants noticed it took them longer to react when something unplanned happened on the road. They had themselves noticed this to some extent, but felt that their experience and ability to look for extra hazards on the road coupled with leaving a larger gap to the vehicle in front helped overcome this issue. In most cases participants felt their reactions had not reduced to such a level as to be dangerous and such compensatory behaviour more than made up for it. Research suggests reaction time shortens from infancy to around 20 years of age, then increases slowly to around 70 years of age and beyond (Jevas and Yan, 2001; Welford, 1977). The age effect is more marked for more complex tasks, like driving (Der and Deary, 2006) and research suggests older drivers do have longer reaction times than their younger counterparts (DfT, 2001). Tests have shown that drivers aged over 55 take 22% longer to react than drivers under the age of 30 years (DfT, 2001).

Glare and lighting conditions on the road

Participants mentioned a decrease in driving in the dark because of an increase in glare from the headlights of other vehicles. Previous research has documented this problem (DfT, 2001). Between the ages of 15 and 65 years, not only does susceptibility to glare increase, the recovery time from glare increases from two to nine seconds, sometimes causing what participants described as a "white-out" (DfT, 2001). Research also suggests that by the age of 75 years drivers may require 32 times the brightness they did at the age of 25 to be able to see effectively. So, tinted glass may increase problems (DfT, 2001). Anything that may help increase luminance at night may help night driving. Trials have looked at "Night Vision" Systems that use infrared technology to increase the luminance of the road ahead and to project the road ahead either head-up on the windscreen or head-down on a screen. Such systems increase target detection distance for both younger and older drivers, at no expense to additional workload measures (Sullivan, Bärgman, Adachi, and Schoettle, 2004). However, participants tended to be wary of such technology, feeling it would be difficult to get used to.

Conclusion

The project has highlighted the importance of a bottom-up needs-led participatory methodology which has been instrumental in exploring driving attitudes, needs and issues. Most importantly older drivers feel they are able to drive as well as they ever have done and certainly as well, if not better, than most other drivers. Previous research has suggested drivers, especially older drivers, do not have insight and awareness of their own reduction in driving ability and skill (Charlton at al, 2001; Cushman, 1996; Marottoli and Richardson, 1998). However, the inclusive methodology adopted in this research has enabled them to focus on their driving needs which has revealed a number of areas where older people have problems, including issues with signage, maintaining a constant speed, tiredness, reactions and glare and luminance of the road. This research suggests older people are quite favourable towards technologies that might help them to continue driving later on in life and further investigation into the technologies is certainly recommended (for further details see Musselwhite and Haddad, 2007). In particular it is suggested that technologies could help in providing extra feedback on current road and driving speed, displaying important road signs in-vehicle, enhancement of night vision and other technologies that reduce glare.

This research has the potential to be a useful anchor for future studies that may focus on (older) driver needs. It also serves as an important platform for future research addressing similar social and attitudinal issues that may mediate or enhance the effect of interventions, such as technology, in overcoming barriers to a fulfilling life and meeting the needs of this important and growing number of individuals. Focusing on older drivers' needs and understanding how they might be met could enable older people to continue driving for longer, whilst retaining confidence in their ability, and ensure that they are safer drivers. In addition, the methodology has provided an opportunity for older people to get involved in research in a thoroughly participatory manner which has ensured that they feel able to shape the research and maximise benefits of the research outcomes for themselves and their age groups.

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