

# Driving in Old Age: Use of Technology to Promote Independence

Karlene K. Ball PhD

Edward R. Roybal Center for Research on Applied Gerontology  
Department of Psychology, University of Alabama at Birmingham  
1530 3rd Avenue South, HM100, Birmingham, AL 35294-2100, USA  
e-mail: kball@uab.edu

Hans-Werner Wahl PhD

The German Centre for Research on Ageing at the University of Heidelberg (DZFA)  
Department of Social and Environmental Gerontology  
Berghheimer Strasse 20, D-69115 Heidelberg, Germany  
e-mail: wahl@dzfa.uni-heidelberg.de

*K.K. Ball, H.-W. Wahl, Driving in Old Age: Use of Technology to Promote Independence, Gerontechnology 2002; 1(4): 217 - 219.* Car driving is a vital means of mobility for older adults. It is, however, also a critical test for the potential and limits of gerontechnology. We argue with this editorial that the interaction of a triad of variables -person-related functioning, the micro-environment of car technology, and the broader context outside the car - must be considered in order to fully understand this potential and its limits.

**Keywords:** Meaning of driving in old age, interactional perspective, cultural issues

In most developed countries around the world, driving is a vital means of mobility. Maintaining driving competence in the later years of life can be integral to an individual's health, independence, and quality of life (see Dr. Owsley's introductory article in this issue). As we age, however, our driving skills may become compromised or called into question. The prospect of the loss of the ability to drive can pose a severe threat to mobility and independence. Driving cessation can lead to negative consequences such as reduced access to social, religious, employment, and health care activities; increased dependence on others; and feelings of depression, isolation, and helplessness. A balance must be struck between society's concern for individual autonomy—represented for many older adults by access to the car keys—and its

equally legitimate concern for public safety. Achieving this balance calls for technological advances in the evaluation of driving risks; development of effective driver rehabilitation programs; vehicle design advances that support the needs of older drivers; improvements in road and signal design that can accommodate subtle, age-related declines in visual and cognitive functions, and the identification of transportation alternatives to promote independence among non-drivers.

The importance of driving for day-to-day mobility is obvious. However, it is sometimes forgotten that driving also represents a major challenge for gerontechnology research. The application of gerontechnology to driving may even be regarded as a critical test of current technology's potential for optimising

human-environment systems in the late human life span<sup>1-3</sup>. There are three primary areas where gerontechnology can have an impact: through enhancing or supplementing the perceptual/cognitive characteristics and skills of the driver, through enhancing supportive technology in the vehicle, and through enhancements to the highway infrastructure itself<sup>4</sup>. These latter two areas are driven by the driver characteristics assessed in the first area. The interaction of driver, vehicle, and environment is a fertile ground for the application of gerontechnology to improve the lives of older adults.

This special issue of Gerontechnology contains a number of invited articles that discuss state-of-the-science solutions to the mobility needs of older drivers and the safety needs of society as a whole along this triad of variables. As a more general background for this analysis, Dr. Mollenkopf and colleagues empirically address the relevance of driving to mobility among older adults in five European countries (Finland, Germany, Hungary, Italy, The Netherlands), comparing rural to urban residents as well as younger (55-74) and older (75+) adults. These authors also examine the importance of driving relative to other modes of travel, with interesting distinctions drawn between car owners and non-owners.

Several papers address advances in the assessment of older driver characteristics such as vision, cognition, and physical function. Dr. Owsley, and Dr. Ball and colleagues, discuss the assessment of visual difficulties and eye diseases experienced with age, while Dr. Horowitz and colleagues focus on psychosocial influences on the decision to stop driving among those with vision problems. Dr. Owsley also discusses the relationship of impairments in cognitive and physical function, and the medical conditions that engender these changes, to crash risk and on-road driving performance. Dr. Ball and colleagues examine advances in the assessment of cognitive function, with a

focus on computer-based assessment of processing speed. They describe recent advances in technology used to improve processing speed in older drivers, with concomitant gains in driving performance and everyday function<sup>5</sup>. Finally, Dr. Rizzo and colleagues discuss advances in assessment of driving performance itself through the use of instrumented vehicles and driving simulators.

Another set of papers in this issue discusses technological advances in vehicle design that can assist the older driver. Dr. Färber examines the potential of telematics applications for enhancing older adults' mobility. Dr. Charlton and colleagues examine vehicle safety with respect to older drivers and passengers. Dr. Warmink discusses vehicle accommodations designed for specific disabilities that sometimes occur among older drivers. The potential use by older drivers of supportive devices such as Global Positioning Systems (GPS)<sup>6</sup>, emergency response systems, vehicle-based sensors<sup>7</sup>, and the potential effects of these devices on older adults' driving performance, are important areas for future research as these systems become both more affordable and more available.

In addition to driver characteristics and vehicle enhancements, infrastructure features complete the triad of variables that compose an integrated transportation system. Advances in highway and signal design, along with other infrastructure-based techniques, will make invaluable contributions to the mobility and safety of older drivers. Dr. Sagawa discusses the relationship of traffic sign design to visibility among older adults with limited visual function. Recent technological advances such as Variable Message Signs (VMS), and the production of more prominent surfacing materials for road markings in order to increase visibility under wet conditions<sup>8</sup>, offer potential means of support for older adults with visual impairments. Finally, as an example for best practice, Dr. Staplin discusses priority areas for infrastruc-

ture improvements that take into account the special needs of older drivers.

This issue of *Gerontechnology* emphasizes the potential for technology to promote older adults' independence through enhancement of driving performance and safety. Long-range planning efforts in the field of transportation must simultaneously take into account the need for transportation alternatives as the global population ages. Obviously, as this special issue is also able to underline, cultural issues of the meaning of driving and even different cultural understandings of what mobility and autonomy mean deserve consideration. For example, Europe probably is behind the U.S. in terms of the 'normalisation' of driving in the later years including the mobility of older women. On the other hand, there has been a major synergy in many European countries of 'independent' car driving and 'dependent' use of well-designed public transportation. Perhaps an examination of this synthesis might stimulate the planning processes in the U.S. as well. In any case and cutting across cultures, technology holds great promise for enhancing mobility among older drivers but also non-drivers. Accordingly, our transportation goals must be to extend autonomy but also safety, to promote independence but also interdependence, and to increase quality of life for young and old alike.

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