Accidents and Close Call Situations Connected to the Use of Mobile Phones in Working-Age People ≥ 50 Years Old

L. Korpinen, R. Pääkkönen, F. Gobba

***Abstract*—**The aim of this paper is to investigate accidents and close call situations connected to the use of mobile phones in working-age people ≥ 50 years old. The paper is part of a cross-sectional study that was carried out in 2002 in 15,000 working-age Finns. The study showed that mobile-phone-related accidents and close call situations, both at work and at leisure, are more common in people under 50 years that in people ≥ 50 years old. However, people under 50 use mobile phones more than those aged ≥ 50.

***Keywords*—**Mobile Phone, Age, Accident, Close call situation.

I. Introduction

EUROPE'S aging population will increase in the future. The number of Europeans aged over 65 years is expected to almost double over the next 50 years, from 87 million in 2010 to 148 million in 2060 [1]. Furthermore, the Europe 2020 Strategy aims to increase the employment rate of the population aged 20–64 to 75%. The average age of workers has increased [2] and many have chronic health problems before the age of 65 [3], [4]. According to [5], [6], aging is associated with progressive decreases in aerobic power, thermoregulation, reaction speed and acuity of the special senses. He has also described the special categories of employment in which a deterioration of vision or hearing can substantially limit employment prospects [5].

The age-related decline in visual ability has also been studied [7], [8]. For example, [9] described that the best color discrimination occurs in people between the ages of 20 and 50.

Aging and different diseases can increase the risk of accidents and close call situations. Moreover, many studies have described the effects of mobile phone usage on driving performance [10]–[21].

The Tampere University of Technology (TUT) has studied the health effects of new technical equipment using a questionnaire. The study was carried out as a cross-sectional study by posting the questionnaire to 15,000 working-age Finns. Of these, 6,121 responses were received. The questionnaire included questions on the familiarity and use of new technical devices, prevalence of physical and mental symptoms, accidents associated with mobile phone use and an open-ended question on health and new technology [22]. In the earlier article [23] we analyzed how the accidents/close call situations are connected to background information, in particular age, gender and self-reported symptoms using the logistic regression models. Altogether 13.7% of respondents had close call situations and 2.4% had accidents at leisure, in which the mobile phone had a partial effect, and at work the amounts were 4.5% and 0.4% respectively, during the last 12 months. Essentially, we found that: (1) men tend to have more close call situations and accidents while on a mobile phone, (2) younger people tend to have more accidents and close call situations while on a mobile phone, but the discrepancy does not appear to be large enough to warrant intervention, (3) employed people tend to have more problems with mobile phone usage and accidents/close call situations, and (4) there was a slight increase in mobile-phone-related accidents/close call situations if the respondent also reported sleep disturbances and minor aches and pains [23].

The aim of this paper is to investigate accidents and close call situations connected to the use of mobile phones in working-age people ≥ 50 years old.

L. Korpinen is with Department of Electronics and Communications Engineering, Tampere University of Technology, P. O. Box 692, 33101 Tampere, Finland (Phone: +358 3 3115 11; fax: +358 3 364 1385; e-mail: leena.korpinen@ tut.fi).

R. Pääkkönen is with Tampere University of Technology, P. O. Box 692, 33101 Tampere, Finland, (e-mail: rauno.paakkonen@gmail.com).

F. Gobba is with the Department of Diagnostic, Clinical and Public Health Medicine, University of Modena and Reggio Emilia Italy, Modena, Italy (e-mail: f.gobba@unimore.it).

II. Methods

Study Population and Questionnaire

With the focus on the working-age population, the questionnaire was sent to 15,000 people between the ages of 18 and 65. This paper concentrates on participants over 50 years of age.

The names and addresses of the participants were obtained as a random sample from the Finnish Population Register Centre. The study design was approved by the Ethical Committee of Pirkanmaa Health District, Finland (decision R02099).

Section V of the questionnaire contained questions about the importance and use of the mobile phone as well as accidents and close call situations while on a mobile phone [22], [23].

III. Results

We received responses from 1,984 persons who were ≥ 50 years old, and 1,286 (64.8%) of them were working. Figs. 1 and 2 show the responses of participants aged ≥ 50 and < 50 respectively to the question 'how important is the mobile phone for your leisure'. Fig. 3 shows the responses of

participants aged ≥ 50 to the question 'how often do you use the mobile phone and associated services for leisure'.

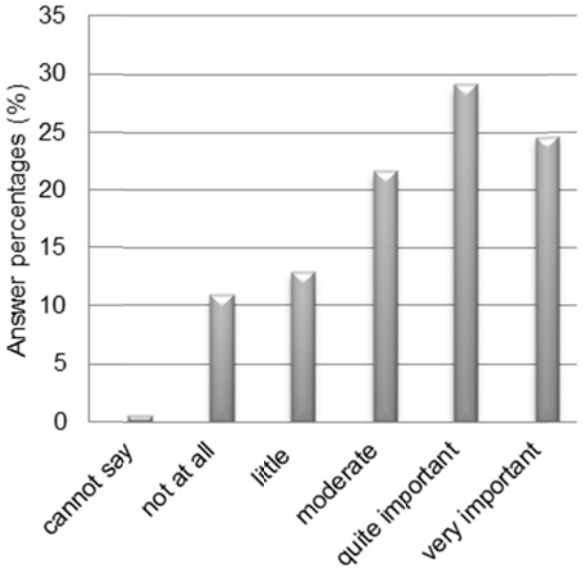

Fig 1 The responses of participants aged ≥ 50 to the question 'how important is the mobile phone for your leisure'

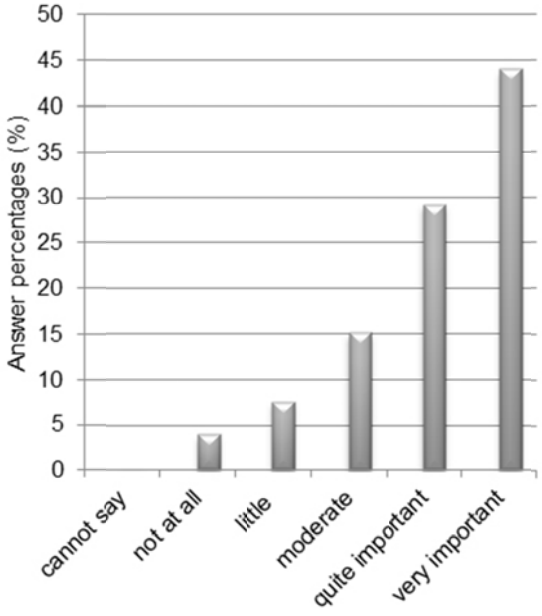

Fig 2 The responses of participants aged < 50 to the question 'how important is the mobile phone for your leisure'

Of the respondents aged ≥ 50, 24.6% responded that the mobile phone was very important and 29.2% responded that it was quite important.

Fig. 4 shows the answers of participants aged < 50 to the question 'how often do you use the mobile phone and associated services for leisure'

Figs. 3 and 4 show that almost 70% of respondents aged ≥ 50 and almost 90 % of those aged < 50 used a mobile phone daily.

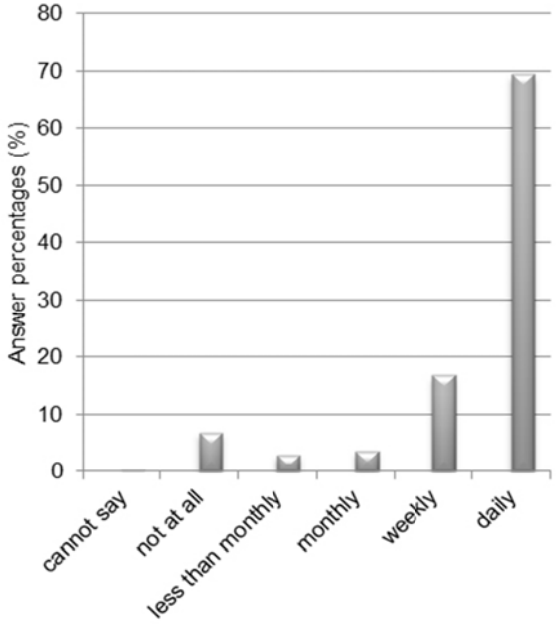

Fig 3 The answers of participants aged ≥ 50 to the question 'how often do you use the mobile phone and associated services for leisure'

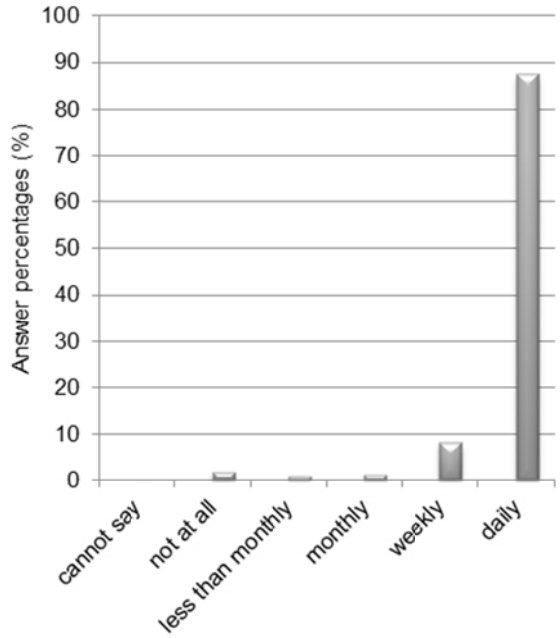

Fig 4 The responses of participants aged < 50 to the question 'how often do you use the mobile phone and associated services for leisure'

Table I shows the answers of respondents aged ≥ 50 to the questions (1) 'during the last 12 months, have you had an accident or accidents at leisure while on a mobile phone' and to question (2) 'during the last 12 months, have you had a close call or close call situations at leisure while on a mobile phone'. In addition, Table I shows the responses of working people aged ≥ 50 to the question (3) 'during the last 12 months, have you had an accident or accidents at work while

on a mobile phone', and to the question (4) 'during the last 12 months, have you had a close call or close call situations at work while on a mobile phone'. Table II shows the responses of respondents aged < 50 to the same questions.

TABLE I
THE ANSWERS OF RESPONDENTS AGED ≥ 50 TO QUESTIONS ABOUT ACCIDENTS AND CLOSE CALL SITUATIONS

	yes (%)	no (%)
	All	
Question 1	1.3	98.7
Question 2	5.7	94.3
	Working people	
Question 3	0.6	99.4
Question 4	3.5	96.5

TABLE II
THE ANSWERS OF RESPONDENTS AGED < 50 TO QUESTIONS ABOUT ACCIDENTS AND CLOSE CALL SITUATIONS

	yes (%)	no (%)
	All	
Question 1	3.0	97.0
Question 2	17.4	82.6
	Working people	
Question 3	0.8	99.2
Question 4	5.4	94.6

IV. DISCUSSION

Evaluation of Methods

The number of responses to the questionnaire was 6,121, which is quite high. Therefore, it was possible to make analyses on subgroups of people, such as participants ≥ 50 years of age.

This data is over 10 years old, which is a long time in consumer technology. For example, laptops and the Internet were quite new when we sent the questionnaire, but nowadays they are well known. However, the mobile phones used in 2002 were quite similar to those used today. On the other hand, now there are smart phones, and it is possible to use Internet services on the mobile phone. The use of the Internet has increased and may now be higher than in 2002. Moreover, it is possible that the mobile phone is now more important to all persons.

Accidents and Close Call Situations Connected to the Use of Mobile Phones

In the group of people ≥ 50 years old, only 1.3% reported mobile-phone-related accidents at leisure during the last 12 months, while in the group of people aged < 50, the percentage was 3%. In addition, 5.7% of people ≥ 50 years old had had close call situations at leisure while on a mobile phone, while in the group of people aged < 50, the percentage was 17.4. The numbers are very low in people aged ≥ 50. Both age groups had fewer accidents and close call situations at work than at leisure.

V. CONCLUSION

In the group of people ≥ 50 years old, only 1.3% reported mobile-phone-related accidents at leisure during the last 12 months, while in the group of people aged < 50, the percentage was 3%. In addition, 5.7% of people ≥ 50 years old had had close call situations at leisure while on a mobile phone, while in the group of people aged < 50, the percentage was 17.4. The numbers are very low in people aged ≥ 50. Both age groups had fewer accidents and close call situations at work than at leisure.

ACKNOWLEDGMENT

The assistance of the staff (Noomi Suuronen, Jari Latva-Teikari and Riitta Lehtelä) of the Environmental Health group, Tampere University of Technology is gratefully acknowledged. Special thanks go to Professor Irma Virjo, Faculty of Medicine, Tampere University, for her advice on designing the questionnaire.

REFERENCES

[1] Eurostat, available at http://epp.eurostat.ec.europa.eu/statistics_explained/index.php/Archive:Regional_population_projections, accessed October 9, 2014.
[2] R. J. Shephard, "Worksite health promotion and the older worker," *International Journal of Industrial Ergonomics 25*, pp. 465–475, 2000.
[3] P. Huuhtanen, M. Piispa, "Attitudes on work and retirement by occupation," in *Aging and Work*, J. Ilmarinen, Ed. Helsinki: Institute for Occupational Medicine, 1993, pp. 152–156.
[4] Å. Kilbom, L. Baltzari, J. Ilmarinen, C. H. Nygaard, C. Nörregaard, P. E. Solem, P. Westerholm, "Aging and retirement: an international comparison," in *Aging and Work*, J. Ilmarinen, Ed. Helsinki: Institute for Occupational Medicine, 1993, pp. 54–62.
[5] R. J. Shephard, *Aging, Physical Activity and Health*. Champaign, IL: Human Kinetics, 1997.
[6] R. J. Shephard, 2000, "Aging and productivity: some physiological issues," *International Journal of Industrial Ergonomics 25*, pp. 535–545, 2000.
[7] K. Ishiharaa, S. Ishiharaa, M. Nagamachia, S. Hiramatsub, H. Osakic, "Age-related decline in color perception and difficulties with daily activities—measurement, questionnaire, optical and computer-graphics simulation studies," *International Journal of Industrial Ergonomics 28*, pp. 153–163, 2001.
[8] D. W. Kline, C. T. Scialfa, "Sensory and perceptual functioning: basic research and human factors implications," in *Handbook of Human Factors and the Older Adult*, A. D. Fisk, W. A. Rogers, Eds. San Diego: Academic Press, 1997, pp. 27–54.
[9] M. S. Roy, M. J. Podgor, B. Collier, R. D. Gunkel, "Color vision and age in a normal North American population," *Graefe's Archive for Clinical and Experimental Ophthalmology 229*, pp. 139–144, 1991.
[10] H. Alm, L. Nilsson, "Changes in driver behaviour as a function of hands-free mobile phones—a simulator study," *Accident Analysis and Prevention 26*, pp. 441–451, 1994.
[11] H. Alm, L. Nilsson, "The effects of a mobile telephone task on driver behaviour in a car following situation," *Accident Analysis and Prevention 27*, pp. 707–715, 1995.
[12] K. A. Brookhuis, G. de Vries, D. de Waard, "The effects of mobile telephoning on driving performance," *Accident Analysis and Prevention 23*, pp. 309–316, 1991.
[13] D. W. Eby, J. M. Vivoda, R. M. St Louis, "Driver hand-held cellular phone use: a four-year analysis," *Journal of Safety Research 37*, pp. 261–265, 2006.
[14] A. T. McCartt, "Cell phones and other driver distractions: Legislation, regulation, and enforcement," a presentation given at the International Conference on Distracted Driving Toronto, Canada, October 4, 2005. Available at http://www.distracteddriving.ca/english/documents/AnneMcCartt000.pdf.
[15] M. Irwin, C. Fitzgerald, W. P. Berg, "Effect of the intensity of wireless telephone conversation on reaction time in a breaking response," *Perceptual and Motor Skills 90*, pp. 1130–1134, 2000.
[16] L. T. Lam, "Distractions and the risk of car crash injury: the effect of drivers' age," *Journal of Safety Research 33*, pp. 411–419, 2002.

[17] D. Lamble, T. Kauranen, M. Laakso, H. Summala, "Cognitive load and detection thresholds in car following situations: safety implication for using mobile (cellular) telephones whole driving," *Accident Analysis and Prevention 31*, pp. 617–623, 1999.
[18] A. J. McKnight, A. S. McKnight, "The effect of cellular phone use upon driver attention," *Accident Analysis and Prevention 25*, pp. 259–265, 1993.
[19] D. L. Strayer, W. A. Johnston, "Driven to distraction: dual-task studies of simulated driving while conversing on a cellular phone," *Psychological Science 12*, pp. 462–466, 2001.
[20] D. L. Strayer, F. A. Drews, W. A. Johnston, "Cell phone induced failures of visual attention during simulated driving," *Journal of Experimental Psychology: Applied 9*, pp. 23–52, 2003.
[21] D. L. Strayer, F. A. Drews, D. J. Crouch, "Comparing the cell-phone driver and the drunk driver," *Human Factors 48*, pp. 381–391, 2006.
[22] L. Korpinen, N. Suuronen, J. Latva-Teikari, R. Pääkkönen, "Questionnaire on the health effects of new technical equipment," *International Journal of Industrial Ergonomics 39*, pp. 105–114, 2009.
[23] L. Korpinen, R. Pääkkönen, "Accidents and close call situations connected to the use of mobile phones," *Accident Analysis and Prevention 45*, pp. 75–82, 2012.

Professor Leena Korpinen is a multidisciplinary scientist: a Doctor of medicine and Doctor of Technology and also a licensed doctor in medicine. Her doctorate handles electric power engineering, more precisely the employee health effects of exposure to low frequency EMF. In 1998 she was awarded professorship in electric power engineering. In 2001-2007 Dr Korpinen led the Laboratory of Electrical Engineering and Health at TUT. From 2008 due to the structural changes at TUT, her professorship has been in environmental health, more specifically "the environmental effects of energy production and distribution, and of traffic". She is also a member of the Bioelectromagnetics Society (BEMS), European BioElectromagnetics Association (EBEA), Member of Conseil International des Grands Réseaux Electriques (CIGRE) and Secretary of the Scientific Committee on Radiation and Work of the International Commission on Occupational Health (ICOH).

Rauno Pääkkönen is Adj. Professor, DSc at the Tampere University of Technology and CEO at his own company. He also works as a Counsellor in Environmental Issues at the Finnish Supreme Administrative Court. His research has been focused on work environmental factors and well-being. He has contributed to more than 300 scientific texts and 150 popular articles. Earlier he was a Director of the theme that included all kind of well-being solutions at work at the Finnish Institute of Occupational Health.

Professor Fabriziomaria Gobba, Associate Professor of Occupational Health, is the head of CRESCE, Chair of the Scientific Committee on Radiation and Work of the International Commission on Occupational Health (ICOH), member of the Board of the Italian Association for Radioprotection (AIRM), and Coordinator of the Emilia-Romagna Regional Section of the same Association. He has 30 years experience in epidemiological studies on adverse effects of chemical and physical risk factors in workers. For about 20 years he has been performing research on occupational and environmental exposure to EMF, mainly ELF, and on possible adverse health effects, and he published several papers on this topic on international scientific journals. He is also member of EBEA and BEMS.