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19 Hearing impairment and adverse outcomes among Europeans

- Hearing impairment is more common in countries where use of hearing aids is less common
- Being hearing impaired predicts symptoms of depression and poor self-rated health
- Developing hearing impairment is associated with increased odds of developing symptoms of depression and poor self-rated health

Impaired hearing affects many older adults and not being able to hear properly challenges the interaction of the individual with the surroundings. Impaired hearing may thus lead to reduced ability to react to signal of immediate danger, reduced social interaction, rejection of visiting theaters and lectures, reduced cultural stimulation and quality of life (Solheim 2011). Furthermore, hearing impairment induces an increased toll on the sensory system to cope with the demands of the daily life (Tun 2009, Jennings 2010), which may mean earlier departure from the labour market. In cross-sectional studies, hearing impairment has been associated with negative outcomes such as depression, cognitive impairment and poor self-rated health (Cronin 2011, Helzner 2011). In a longitudinal design, an American study found an accelerated loss in cognitive decline during six years in older adults with hearing loss compared with older adults with normal hearing (Lin 2013). In Japanese community-dwelling older adults independent in instrumental activities of daily living (IADL), e. g. shopping, using public transportation, handling banking, preparing meals, hearing impairment was significantly associated with the development of dependency in IADLs three years later (Yamada 2012).

The prevalence of hearing impairment increases gradually with ageing (Lin 2011), but varies also by methodology used and criteria for hearing impairment as shown in a recent review based on mainly national surveys in Europe (Roth 2011). Objective assessment of hearing impairment by pure tone audiometry identified 28.5 per cent of 50–59 year olds to have a hearing loss > 25dB, gradually increasing with advancing age groups and being 89.1 per cent in 80+ year olds (Lin 2011). In general, this is higher than for self-report of hearing impairment, which is known to underestimate objectively measured hearing impairment (sensitivity 41–65 %) (Agrawal 2008) but self-report of hearing impairment is still accepted in epidemiological studies where pure tone audiometry is not feasible (Valete-Rosalino 2005).

But irrespective of the method, hearing impairment is a condition associated with substantial negative consequences for the individual, which may thus hamper active ageing and social interaction. However, although the evidence is clear from national studies as described above, large scale cross-national comparisons using one method do not exist, neither in a cross-sectional nor in a longitudinal setting.

In this chapter we describe the prevalence of hearing impairment and study whether being hearing impaired at Wave 2 could predict having symptoms of depression, cognitive impairment, and poor self-rated health at Wave 4. Furthermore, among those without hearing impairment at Wave 2, we studied the association of becoming hearing impaired (incident hearing impairment) during the four years between Waves 2 and 4 with status of symptoms of depression, cognitive impairment, and poor self-rated health at Wave 4. Lastly, among those aged between 50 and 64 years old, we studied the association of hearing impairment with not being employed at Wave 4.

We used data from the twelve countries participating in both SHARE Waves 2 and 4: Sweden, Denmark, Germany, Belgium, the Netherlands, Austria, Switzerland, France, Spain, Italy, Poland and Czech Republic, a total of 17,213 individuals.

Impaired hearing was categorised from answers to the question 'Is your hearing (using a hearing aid as usual)'. Responding 'fair' or 'poor' defined those having impaired hearing while those responding 'excellent', 'very good' or 'good' were categorised as not having impaired hearing.

Assessment of adverse outcomes included i) symptoms of depression using the EURO-D scale, which consists of 12 items and ranges from 0-12 and those with scores from 4 to 12 were categorised as having symptoms of depression (Prince 1999) ; ii) cognitive function using a ten-word list-learning test from which scores ranged from 0 to 10 words recalled (Souchay 2000) with those with scores 0 to 3 were categorised as cognitively impaired; iii) poor self-rated health using the standard question 'Would you say your health is' and those answering 'fair' or 'poor' defined poor self-rated health versus those answering 'excellent', 'very good', or 'good'. Lastly, we looked at employed SHARE Wave 2 respondents aged 50 to 64 years and the association between the incident of hearing impairment and employment status in Wave 4.

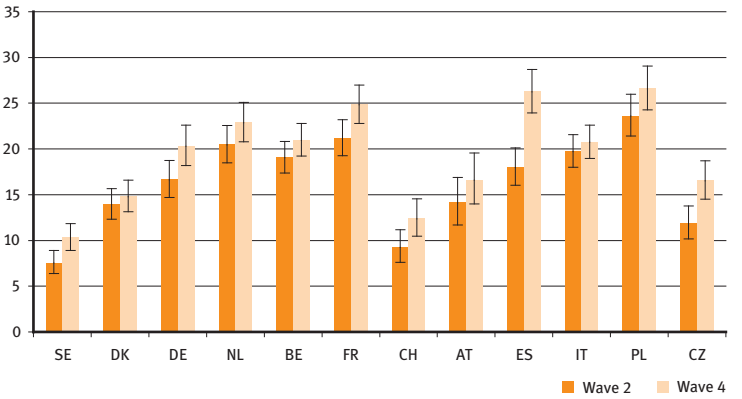
The analyses were controlled for age, gender, having poor vision, having experienced limitations in performing usual activities during the last six months, and the use of hearing aid. As use of hearing aid may be affected by access to health care we also controlled for individual wealth, which was defined as the sum of all financial and real assets (minus liabilities) and categorised into country-specific tertiles. Education was also included using the International Standard Classification of Education from which three groups were formed: lower-secondary school

or lower (levels 0–2), upper secondary (level 3), post secondary (levels 4–6). The time-interval between interviews in Wave 2 and Wave 4 was included, varying from 42 to 65 months between respondents.

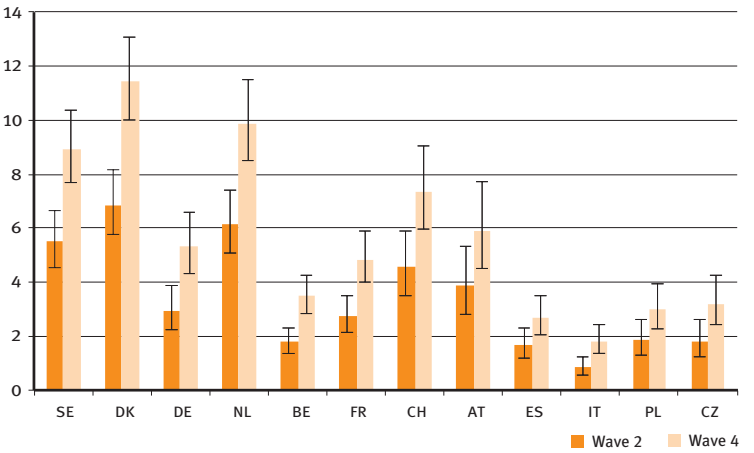
When analysing the predictive power of hearing impairment for adverse outcomes by means of a multiple logistic regression, robust variance estimation was used as the observations over time are not independent from each other. Four models were estimated (Model 1: baseline level of outcome variable and time interval. Model 2: 1 + age, gender. Model 3: 2 + remaining covariates; Model 4: 3 + hearing aid use, not shown in figures). The analytical sample comprised only those without missing information in any covariate, leaving 17,213 for the analysis on prevalence and hearing impairment as predictor, 13,708 for the analysis of incident hearing impairment, and 4,050 for the analysis of incident hearing impairment and employment maintenance. As the longitudinal analyses were carried out on unweighted data for the two waves the results presented here may be subject to minor changes when weighted data become available.

19.1 The prevalence of hearing impairment and use of hearing aid among 50+ year old Europeans in 2006 and 2010

Overall, the prevalence of self-reported hearing impairment at Wave 2 was 18 per cent. 13.6 per cent developed hearing impairment between Wave 2 and 4. In the age group 65+ years 24.2 per cent had hearing impairment and more men than women reported such difficulties. The age- and gender adjusted proportion of hearing impairment varied among the European countries (Figure 19.1a). In Sweden, for example, only 8.0 per cent reported hearing impairment in Wave 2, whereas in France this amounted to 24.0 per cent of respondents. The proportion of respondents reporting to have a hearing aid varied from 0.8 to 6.9 per cent in Wave 2 and 1.8 to 11.5 per cent in Wave 4, being particularly low in Southern and Eastern European countries, but also in Germany, Belgium and France, especially in Wave 2. In most countries a significant increase in the proportions of hearing aid users was identified from Wave 2 to Wave 4, which could be expected due to the ageing of the cohort. However, the highest increases were seen in the Northern SHARE countries Sweden, Denmark, the Netherlands, as well as Switzerland. With the exception of the Netherlands, there was in general an inverse relationship between having a hearing aid and reporting having a hearing problem (Figure 19.1a and 19.1b).



(a) Hearing impairment (n=17,213)



(b) Hearing aid use (n=17,213)

Figure 19.1: Cross-national proportions of respondents reporting hearing impairment and hearing aid use in Wave 2 and Wave 4
Notes: Data are presented as per cent with 95 % confidence intervals and are adjusted for age and gender.
Source: Wave 2 release 2.5.0, Wave 4 release 1

19.2 Hearing impairment as a predictor of adverse health outcomes over four years

When adjusting only for the baseline level of outcome variable and time interval between interviews (model 1), those having hearing impairment (HI) at Wave 2 were at higher odds of reporting symptoms of depression (DS), cognitive impairment (CI) and poor self-rated health (SRH) (Odds Ratios [95 % Confidence interval] DS, 1.39 [1.26–1.52], CI, 1.65 [1.49–1.82], and SRH, 1.48 [1.35–1.62]), respectively, compared with those without HI (Figure 19.2). When adjusting for multiple covariates as in Model 3 reduced the odds for DS, CI, and poor SRH, respectively, and only the odds ratios of DS and poor SRH remained statistically significant. Adding baseline HA use to the model did not change the estimates (analyses not shown). Among those being employed at baseline in Wave 2 and below 65 years of age, hearing impairment did not predict whether they were not being employed at follow-up in Wave 4 in the fully adjusted model (data not shown).

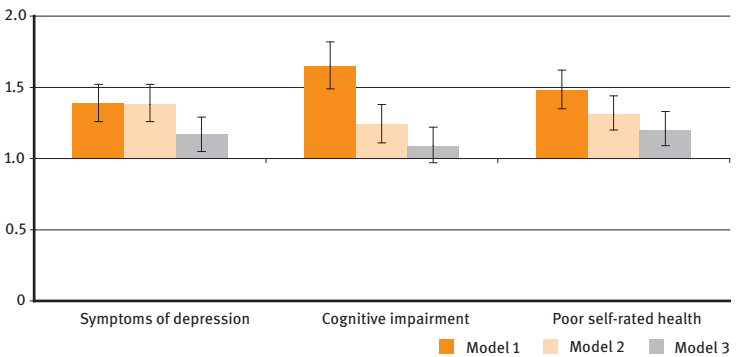


Figure 19.2: Hearing impairment at Wave 2 predicting symptoms of depression, cognitive impairment, and poor self-rated health at Wave 4
Notes: Model 1: adjusted for baseline dependent variable and time interval. Model 2: adjusted for Model 1 + age, gender. Model 3: adjusted for Model 2 + poor vision, limited in usual activities, wealth, education, and country. Data are presented as odds ratio and 95 % confidence interval (*Symptoms of depression*, *n=16,753; Cognitive Impairment, n=16,870; Poor self-rated health, n=17,125)*.
Source: Wave 2 release 2.5.0, Wave 4 release 1

19.3 Incident hearing impairment and odds of adverse health outcomes

When analysing only those who did not report hearing impairment at Wave 2, having developed a hearing impairment at follow-up at Wave 4 was associated with higher odds of experiencing DS (OR 1.88 [1.68–2.11])), CI (OR 1.91 [1.68–2.18]), poor SRH (OR 2.35 [2.10–2.64]), and becoming unemployed (OR 1.23 [0.98–1.53]), respectively, compared to those who had not experienced a hearing impairment incident. However, when adjusting for all covariates the magnitude of the associations were reduced and only DS and poor SRH remained statistically significant. Hence, compared to participants not developing hearing impairment, incident hearing impairment between Waves 2 and 4 was associated with higher odds for having DS (OR 1.42 [1.26–1.62]) and poor SRH (OR 1.58 [1.38–1.81]) at Wave 4, respectively.

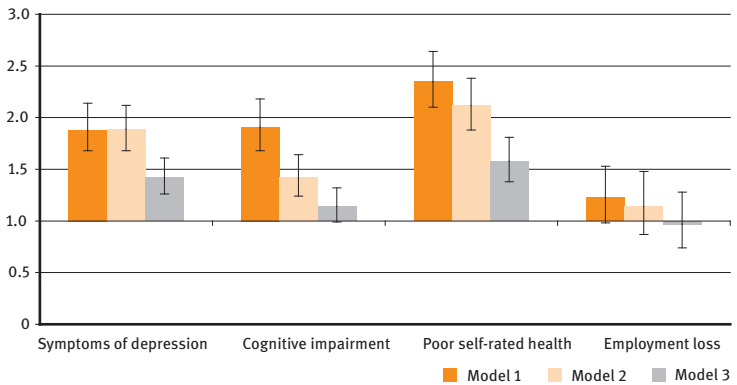


Figure 19.3: Incident hearing impairment at Wave 4 and association with symptoms of depression, cognitive impairment, poor self-rated health, and unemployment at Wave 4
Notes: Model 1: adjusted for baseline dependent variable and time interval. Model 2: adjusted for Model 1 + age, gender. Model 3: adjusted for Model 2 + poor vision, limited in usual activities at waves 2 and 4, and wealth, education, and country. Furthermore, levels of other adverse outcomes at waves 2 and 4. Data are presented as odds ratio and 95 % confidence interval (*Symptoms of depression*, *n=13,708; Cognitive Impairment, n=13,708; Poor self-rated health, n=13,708; Unemployment, n=4,050)*.
Source: Wave 2 release 2.5.0, Wave 4 release 1

19.4 Hearing impairment predicts symptoms of depression and poor self-rated health

This is the first large-scale, population-based European study of the longitudinal effect of hearing impairment on adverse outcomes, where inclusion of multiple covariates at the micro level provided better knowledge of the negative implications of hearing impairment on health, i. e. poor self-rated health and depressive symptoms. Both are adverse health outcomes with high individual and societal costs. At the individual level isolation and as a consequence low social activity, perhaps even social exclusion, may have devastating effects for the older person (Arlinger 2003) who may already be at risk of social isolation due to loss of the next of kin. Furthermore, isolation and lack of social engagement may lead to less physical activity resulting in loss of functions (Gopinath 2012).

Although we were unable to show a significant relationship between the development of hearing impairment and cognitive impairment when adjusting for relevant covariates, others have found such a relationship (Arlinger 2003, Lin 2013). Since cognitive impairment is a slow insidious condition it may well be that the time span was not long enough to disclose a significant decline in cognitive ability. Also, as self-reported hearing impairment underestimates true hearing impairment our results based on self-reported hearing impairment may not have enough strength to pick up a cognitive decline in the specified time period. The same underestimation may also imply higher impact on the negative outcomes found with respect to self-rated health and depressive symptoms.

As expected, the almost inverse proportions of hearing impairment versus use of hearing aid suggest that access to hearing aid relieves the sensation of hearing impairment. Given the many negative consequences of hearing impairment, here shown as an increased risk for developing depressive symptoms and poor self-rated health, policymakers should address the need for screening of hearing ability, and make access to hearing aids easy for older adults. Following such recommendations may have a high impact on increasing active and healthy ageing and intergenerational solidarity by the mere effect of improved communication and social interaction.

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