

## 8 Does hearing impairment lead to social exclusion?

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- ▶ The development of hearing difficulties is positively associated with feeling left out of things often and negatively associated with the frequency at which individuals carry out social activities
  - ▶ Hearing impairment increases subjective feelings of exclusion throughout the population, while it threatens the objective participation in social activities only for the population aged 70 + and among those who have a large social network
  - ▶ Feelings of exclusion and reduced social participation act as pathways through which hearing problems may lead to depression, functional limitations and cognitive impairment
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### 8.1 The effects of hearing loss late in life

Hearing loss is a common sensorial deficit among older people. In an ageing society, the assessment of its consequences in terms of physical and mental health and quality of life is of uttermost importance to understand whether there is a scope for policies facilitating audiological rehabilitation that may improve the well-being of senior individuals affected by hypoacusia.

Recent empirical evidence (see Arlinger 2003 for a review) shows indeed that hearing impairment is associated with limitations in activities of daily living (Gopinath et al. 2012), a faster cognitive decline (Lin et al. 2013), and increased odds of developing symptoms of depression (Andersen-Ranberg & Vestergaard 2013). Nevertheless, little is known yet about pathways that can explain these effects and understanding mechanisms is crucial to design interventions that could help hearing impaired people and to target them to those for whom the consequences would be more negative.

One such channel could be that hearing impairment leads to reduced participation in social activities and in turn to social isolation, which has been shown to increase symptoms of depression (Abu-Rayya 2006) and to impair cognitive functions (Fratiglioni et al. 2000).

Although we are not the first to address this topic, previous studies on the matter do not lead to univocal conclusions. On the one hand, using longitudinal data from the Alameda Country Study, Strawbridge et al. (2000) showed that baseline hearing impairment is associated with feelings of being left out and loneliness in a one-year follow-up. On the other hand, in a prospective study on

Japan, Yamada et al. (2012) showed that baseline hearing impairment plays no role in predicting enjoyment in carrying out social activities in the three-year follow-up. Both studies rely on measures of subjective social inclusion and loneliness, rather than on objective measures like the frequency at which individuals carry out social activities. An early exception in this sense is Weinstein and Ventry (1982) that report a cross-sectional negative correlation between objective social inclusion and hearing impairment. Furthermore, no comparable evidence is available for other countries, and no evidence about the consequences of the onset – rather than the prevalence – of hearing impairment is available either.

This paper tries to fill these gaps using cross-national longitudinal data on the European older population from the SHARE survey, where information on self-reported hearing impairment, subjective feelings of exclusion and objective indicators of involvement in social activities are available.

Our analysis shows that, conditional on the baseline level of the outcome and a large set of baseline covariates measuring socio-economic status, physical and mental health, developing hearing impairment between the two interviews is associated with increased feelings of being left out of things and with a lower likelihood of carrying out activities that involve a social component at least once a week, confirming that social exclusion can be a pathway through which hearing impairment leads to other negative health outcomes.

To gain a better understanding about the subpopulations that are mostly affected by the negative social consequences of hearing impairment, we carry out a subgroup analysis. We split the sample by age groups, distinguishing between people below and above age 70, and between respondents whose social network size is below and above the median level by country. On the one hand, those aged 70+ belong to the top quartile of the age distribution in the sample of unimpaired individuals at baseline, and are clearly above working age in all countries and for most occupations. Also, there is a discrete jump in cognitive impairment at age 70, as shown in Celidoni et al. (2013). On the other hand, social network size is a proxy for the baseline level of social inclusion. Interestingly, while subjective feelings of exclusion are significantly associated with incidental hearing impairment for people both below and above age 70, we detect a significant association between the onset of hearing difficulties and the involvement in social activities only for people aged 70+. We observe a similar pattern also when we split the sample by social network size: we find significant effects on the involvement in social activities only for those with a large social network. This may surprise, because having a large network could mitigate the consequences of hearing impairment. But people with a small network are less likely to carry out social activities to begin with, and this could explain why we do not see negative differences for them.

These findings allow us to identify the 70+ and those with a large social network as the groups for whom hearing loss is more likely to lead to reduced social participation, and this information can be used to target rehabilitative interventions, such as public subsidies towards the purchase of hearing aids.

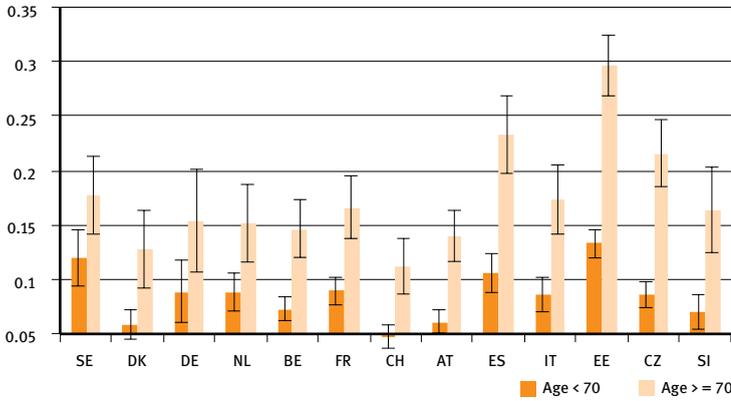
The chapter is organised as follows: section 8.2 presents the data and some descriptive statistics. The empirical model for the multivariate analysis is introduced in section 8.3 and results are shown in section 8.4. Conclusions follow thereafter.

## 8.2 Data and descriptive statistics

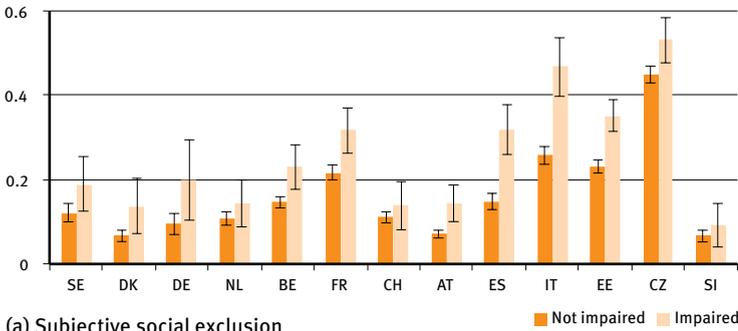
We use data on individuals from 13 European countries that participated in both SHARE Wave 4 and 5 and were aged between 50 and 85 at the baseline SHARE Wave 4 interview. The full baseline sample is composed of 31,608 observations. Prevalence of hearing impairment at baseline is 18.13 per cent in the full sample, and ranges from a minimum of 9.6 per cent in Austria and a maximum of 24.4 in Estonia. Since our longitudinal analysis is focused on measuring the consequences of the onset of hearing impairment, we consider only individuals who were not impaired at baseline. Once we drop individuals with missing values for the covariates considered in the analysis, described below, we are left with a total sample of 25,878 observations.

As in Andersen-Ranberg and Vestergaard (2013) we use self-reported information on “hearing abilities using hearing aid as usual”, and define individuals as impaired if they report to have a “fair” or “poor” hearing, and not impaired if they claim to have a “good”, “very good” or “excellent” hearing. Figure 8.1 reports the fraction of people developing hearing impairment between the two waves by country and age group. We compute that 11.3 per cent of the full sample have developed hearing impairment between waves. As expected, the onset of hearing impairment is more common for people aged 70+, among whom the incidence equals 18.3 per cent, but increasing hearing difficulties are also acknowledged by 8.5 per cent of respondents younger than 70. Furthermore, we detect a large variability in the onset rate across countries, with the lowest incidence in Switzerland (6.4 %) and the highest in Estonia (18.2 %).

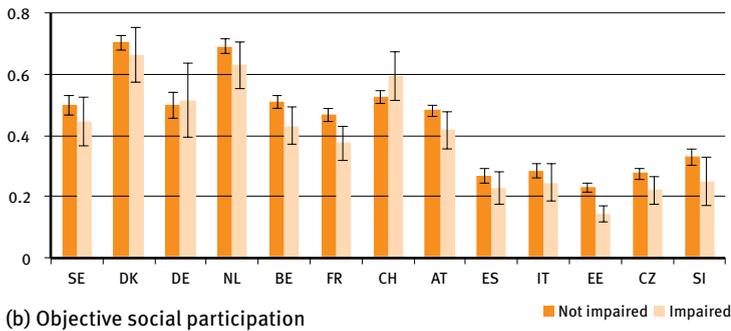
We measure subjective social exclusion with whether the individual feels left out of things often, and objective social participation with whether the respondent carries out one or more of the following activities at least once a week: voluntary or charity work, educational and training programs, participation in religious, political or community-related associations, playing cards or games such as chess. Figure 8.2 reports subjective social exclusion and objective social participation rates at the follow-up, by country and hearing impairment status at the follow-up.



**Figure 8.1:** Incidental hearing impairment, by country and age group  
 Notes: The sample includes only individuals with no hearing problems in SHARE Wave 4; number of observations: 25,878  
 Source: SHARE Wave 4 release 1.1.1, Wave 5 release 0



(a) Subjective social exclusion



(b) Objective social participation

**Figure 8.2:** Subjective social exclusion and objective social participation rates at the follow-up by country and hearing impairment status at the follow-up  
 Notes: The sample includes only individuals with no hearing problems in SHARE Wave 4; number of observations: 25,878  
 Source: SHARE Wave 4 release 1.1.1, Wave 5 release 0

Although there is large heterogeneity in both subjective social exclusion and objective social participation across the different European countries, people with hearing impairment issues report higher levels of exclusion and lower participation in most countries. Pooling data across all countries, we compute that the share of respondents who did not develop hearing issues between the two waves declaring to feel excluded is equal to 17.8 per cent. This share is equal to 29.3 per cent among those who report to have developed hearing difficulties, a statistically significant positive difference of 64.6 per cent with respect to the mean value for the non-impaired. The picture is similar as far as objective social participation is concerned: the share of non-impaired people carrying out at least one social activity weekly equals 42.6 per cent, while this is true only for 33.2 per cent of those who have developed hearing impairment. The difference is statistically significant and equal to 22 per cent of the mean value for those who did not develop hearing issues.

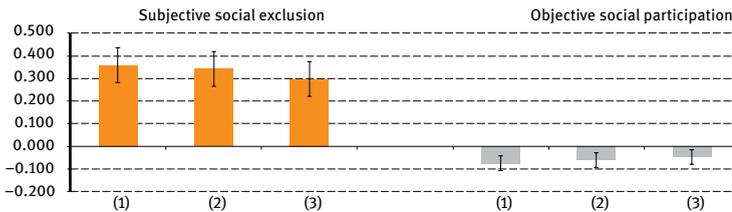
### 8.3 Empirical methods

We perform a multivariate regression analysis to assess the robustness of the bivariate associations shown so far, adjusting for a progressively more extensive set of demographic, socio-economic and health-related controls.

In a sample of non-impaired individuals at baseline, we model the association between incidental hearing impairment between the baseline and follow-up interviews and the probability of subjective social exclusion and objective social participation at the follow-up using Probit models with robust standard errors. All regression models include controls for the baseline level of the outcome variable, gender, country dummies, the distance in months between the baseline and the follow-up interview, living in a rural area at baseline, the use of hearing aids at baseline, and a full set of age dummies (the basic controls set). We progressively include controls for baseline socio-economic status (having a partner, children or grandchildren, weekly contact with children, education levels, dummies for wealth and income quartiles by country, employment status and having a social network size above the median size) and baseline health (having any limitation in ADLs or IADLs, poor sight, depression and word recall ability).

## 8.4 Results

Figure 8.3 reports the marginal effects of the onset of hearing difficulties on subjective social exclusion and objective social participation.



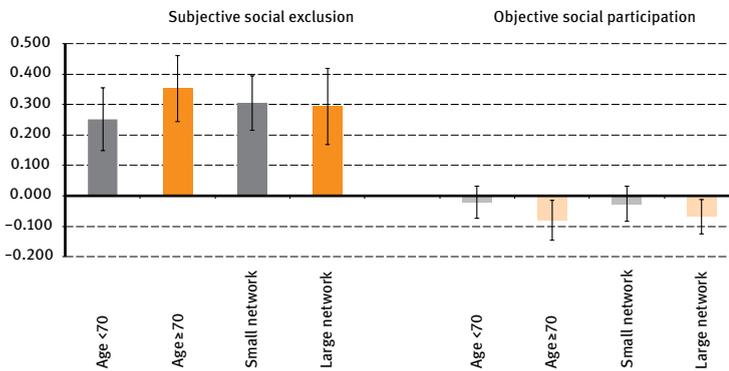
**Figure 8.3:** Incidental hearing impairment, social exclusion and social participation, marginal effects

Notes: We report the estimated coefficients as percentage of the mean of the dependent variable in the sample of non-impaired individuals. The sample includes only individuals with no hearing problems in SHARE Wave 4; number of observations: 25,878; robust standard error used to compute confidence intervals; (1) Basic controls included, (2) + S.E.S controls, (3) + health controls  
Source: SHARE Wave 4 release 1.1.1, Wave 5 release 0

Results presented in Figure 8.3 broadly confirm the patterns described by the bivariate associations: we detect negative and statistically significant associations between hearing impairment, on the one hand, and subjective social exclusion and objective social participation on the other. The estimated marginal effects are precisely estimated and decrease in size as we add covariates, especially those related to physical and mental health. When we relate the estimated marginal effects to the mean outcome in the group of non-impaired individuals we estimate that poor hearing leads to an increase in the likelihood of feeling left out of things often of 29.7 to 35.9 per cent, depending on the empirical specification, and to a decrease in the probability of carrying out social activities at least once a week of -4.7 to -7.5 per cent. The association is strongly significant for both subjective and objective outcomes, but the marginal effect is larger for subjective social exclusion. Hence, hearing impairment strongly hampers the perception people have about their inclusion, and also prevents them to carry out activities that involve social interactions, but to a smaller extent.

Marginal effects for the controls are not reported in the chapter to save space, but we briefly describe here results for the specification including all controls. Both outcomes are very persistent, as the baseline outcome level is positively and significantly associated with the follow-up one. There are no significant gender differences in objective social exclusion, but females feel left out more often than males. Feelings of exclusion reach a minimum at age 65, while participation in

social activities peaks between 65 to 67 years. Individuals with a partner feel excluded less often, but having a partner makes no difference in social activities. Wealth is positively associated with subjective and objective social inclusion, and people with higher education carry out more social activities. There are no differences in objective participation by employment status, but employees and retirees feel left out less often than housewives, disabled and unemployed respondents. Respondents having a social network size above median level by country feel left out less often, and are more likely to carry out social activities. Finally, poor physical and mental health, poor eyesight and low levels of cognition are also positively and significantly related with subjective and objective social exclusion.



**Figure 8.4:** Incidental hearing impairment, social exclusion and social participation, heterogeneous effects by age group and social network size, marginal effects

Notes: We report the estimated coefficients as percentage of the mean of the dependent variable in the sample of non-impaired individuals; the sample includes only individuals with no hearing problems in SHARE Wave 4; robust standard error in parentheses; basic, S.E.S. and health controls included

Source: SHARE Wave 4 release 1.1.1, Wave 5 release 0

To provide some empirical evidence about the subpopulations exposed to a greater risk of suffering the negative social consequences of hearing impairment, we re-estimate our model after splitting the sample between respondents aged above or below 70 years at baseline – which corresponds to the top quartile of the age distribution – and between respondents who have a baseline social network size below or above the median level by country – a proxy of their baseline level of inclusion. Figure 8.4 reports marginal effects estimated in the split samples for the most extensive model specification that includes all the controls listed above.

The left panel shows that both younger and older respondents feel left out of things more often if affected by hearing impairment and that hearing impairment

is also positively associated with subjective feelings of exclusion irrespectively of social network size. However, in the right panel we see that the association between hearing impairment and objective social participation is only statistically different from zero for older individuals and for respondents who have a large social network at baseline. While in principle having a large social network could play a protective role for social participation, people with small networks are less likely to take part in social activities to begin with, and are thus only to a lesser extent affected by the negative social consequences of hearing impairment.

## 8.5 Policy implications

Hearing loss is a common perceptual constraint within the senior population that is negatively associated with depression, functional limitations and a faster cognitive decline.

This chapter used longitudinal information on a representative sample of the European population aged 50 to 85 to show that the onset of hearing impairment leads to increased feelings of social exclusion and to reduced participation in activities that involve social interactions, the former association being quantitatively more relevant than the latter. While the whole population suffers from estrangement related to the insurgence of hearing difficulties, actual behavioural changes in objective social participation are detected only among respondents aged 70 years or more as well as for respondents which had previously reported to have a large social network.

Our results suggest that the negative consequences of hearing impairment on physical and mental health can be partly due to the consequences of hypoacusia on subjective and objective social exclusion. Furthermore, our subgroup analysis suggests that the population more exposed to these risks are the older and those who have a larger network. By highlighting which subgroups of the population suffer more of the negative social consequences of hearing impairment, our findings are particularly relevant for the design and the targeting of rehabilitative interventions, such as subsidies to purchase hearing aids.

## References

- Abu-Rayya, Hisham (2006): “Depression and social involvement among elders”. In: *The Internet Journal of Health* 5, DOI: 10.5580/1df2.
- Andersen-Ranberg, Karen, Vestergaard, Sonja (2013): “Hearing impairment and adverse outcomes among Europeans”. In: Börsch-Supan, Axel, Brandt, Martina, Litwin, Howard,

- Weber, Guglielmo (Eds): *Active ageing and solidarity between generations in Europe: First results from SHARE after the economic crisis*. Berlin: De Gruyter.
- Arlinger, Stig (2003): “Negative consequences of uncorrected hearing loss – a review”. In: *International Journal of Audiology* 42, p. 2517–2520.
- Celidoni, Martina, Dal Bianco, Chiara, Weber, Guglielmo (2013): “Early retirement and cognitive decline. A longitudinal analysis using SHARE data”. In: *“Marco Fanno” Working Papers 0174*. Dipartimento di Scienze Economiche “Marco Fanno”. Padova, Italy: University of Padova.
- Fratiglioni, Laura, Wang, Hui-Xin, Ericsson, Kjerstin, Maytan, Margaret, Winblad, Bengt (2000): “Influence of social network on occurrence of dementia: a community-based longitudinal study”. In: *The Lancet* 355, p. 1315–1319.
- Gopinath, Bamini, Schneider, Julie, McMahon, Catherine, Teber, Erdahal, Leeder, Stephen, Mitchell, Paul (2012): “Severity of age-related hearing loss is associated with impaired activities of daily living”. In: *Age and Ageing* 41, p. 195–200.
- Lin, Frank, Yaffe, Kristine, Xia, Jin, Xue, Qian-Li, Harris, Tamara, Purchase-Helzner, Elizabeth, Satterfield, Suzanne, Ayonayon, Hilsa, Ferrucci, Luigi, Simonsick, Eleanor (2013): “Hearing loss and cognitive decline in older adults”. In: *JAMA Internal Medicine* 173, p. 293–299.
- Strawbridge, William, Wallhagen, Margaret, Shema, Sarah, Kaplan, George (2000): “Negative consequences of hearing impairment in old age: a longitudinal analysis”. In: *The Gerontologist* 40, p. 320–326.
- Weinstein, Barbara, Ventry, Ira (1982): “Hearing impairment and social isolation in the elderly”. In: *Journal of Speech, Language, and Hearing Research* 25, p. 593–599.
- Yamada, Mutsuko, Nishiwaki, Yuji, Michikawa, Takehiro, Takebayashi, Toru (2012): “Self-reported hearing loss in older adults is associated with future decline in instrumental activities of daily living but not in social participation”. In: *Journal of the American Geriatrics Society* 60, p. 1304–1309.

