

Summary



The aim of this thesis is to obtain insight into how hearing impairment may impact the lives of adults, and the determinants and consequences of a deterioration in speech recognition ability over time. Baseline and five-year follow-up results of the Web-based National Longitudinal Study on Hearing (NL-SH) are reported.

The general introduction describes the background of the following four main topics that that are covered in this thesis:

- The co-existence of chronic conditions with impaired hearing ability (comorbidity).
- Participation in work life for people with and without hearing difficulties.
- Changes in speech recognition in noise over a period of five years.
- Deterioration in hearing ability over a period of five years and its concurrent effects on psychosocial health.

Chapters 2 and 3 present the cross-sectional studies related to comorbidity and hearing. In the study described in Chapter 2 associations between hearing ability in noise, as measured by the online National Hearing Test, and a list of 27 self-reported chronic conditions were determined. Overall, the co-occurrence of chronic conditions is more common in adults with hearing impairment than in their normally hearing peers. Multinomial regression models revealed significant associations between hearing ability and 'dizziness and falling' and types of arthritis other than osteoarthritis and rheumatic arthritis. Diabetes was also found to be significantly associated with poorer hearing ability in noise, even after adjustment for age and gender.

Chapter 3 describes the associations between hearing ability in noise use and the use of medication in the past 12 months. Poorer hearing ability was significantly associated with medication used for diabetes. No significant associations between hearing ability and use of other types of medication were found. The study included medication for hypertension, dizziness, and arthritis. These findings emphasize the importance of the relationship between diabetes and hearing disability. It needs further investigation, e.g., what are the mechanisms behind this association? Although the evidence of this relationship is growing worldwide, awareness of hearing problems co-existing with diabetes is not yet widely spread in regularly diabetes care and audiology.

Participation in paid and unpaid work of adults with and without hearing impairment is the central topic of the study described in Chapter 4. Adults with poor speech recognition ability in noise aged 18 to 64 years had a relatively poorer socioeconomic status than their normally hearing peers, as indicated by paid work, educational level, and income. People with poorer hearing ability are more likely to be looking for work or to be unfit for work. This indicates that hearing health care professionals have to consider supportive programs for adults with hearing impairment who want to enter or re-enter the workforce.

The five-year follow-up results of the NL-SH study are presented in Chapter 5. In the total group of adults aged 18 to 70 years, on average a small numeric reduction in speech recognition ability was observed. The mean deterioration was 0.4 dB SNR over five years for the entire group. Considering the steepness of the psychometric function of the NHT, which is approximately 20 percent per DB, a 0.4-dB change corresponds to approximately 8 percent loss in speech recognition in difficult listening situations. In the age group of 50 to 59 years (at baseline) there was an accelerated deterioration. This acceleration around the age of 50 years was also suggested in previous studies, but none of these used a longitudinal design. Our results are the first in the international literature based on longitudinal data.

As a deterioration in hearing may be related to psychosocial health problems such as loneliness, depression, distress, anxiety, and somatization, longitudinal data analyses were performed to study these relationships (Chapter 6). A key finding is averaged over a period of five year, poor hearing ability is associated with increased levels of emotional and social loneliness. A deterioration in hearing ability was in some subgroups of participants (participants who became married and those who did not use hearing aids at both measurements) related to increased feelings of social loneliness. No significant longitudinal associations appeared between hearing ability over time and the other mentioned psychosocial health outcomes.

Finally, Chapter 7 presents the main conclusions. Also some methodological issues related to Web-based studies, such as representativeness of an Internet sample and repeated measures of speech recognition ability over the Internet, are discussed. Recommendations for future research are the following:

- Further investigations in comorbidity, in particular the co-existence of hearing problems and diabetes.
- More insight needed in the process of hearing deterioration over a longer period of time than five years.
- The longitudinal patterns between hearing status and loneliness, thereby incorporating new epidemiological longitudinal analysis methods need to be investigated.
- Innovation in Web-based studies may provide new opportunities to measure even more concepts of interest related to participation in daily life.

Altogether, the current results urge that hearing health care professionals should work from a broad perspective, in concordance with the International Classification of Disability, Functioning and Health (ICF) theoretical model. Consideration of people's age (as hearing ability may start to deteriorate earlier than at the age of 65 years), comorbidity status (including individuals' vulnerability to loneliness), and individuals' needs for participate in work is needed to provide optimal care or support. Continuation of the NL-SH study and other longitudinal epidemiological studies in hearing is indispensable to study the changes in hearing ability over the life span, and its subsequent consequences for functioning in daily life.