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Vibeke Tornhøj Christensen

HARD OF HEARING

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HEARING PROBLEMS AND WORKING LIFE. SUMMARY IN ENGLISH OF THE DANISH REPORT ENTITLED *UHØRT?*

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FOREWORD

Hearing problems affect a significant section of the Danish population. A hearing impairment can lead to reduced ability to communicate which can in turn result in social isolation and withdrawal from the labour market. This report is a summary of the Danish report entitled: *Uhørt? Betydningen af nedsat hørelse for arbejdsmarkedstilknytning og arbejdsliv* (Hard of hearing? The effect of reduced hearing on labour-market attachment and working life) published by the Danish National Institute of Social Research in October 2006. The report analyses how working life is experienced by people with reduced hearing and the connection between reduced hearing and labour-market attachment for Danes aged 50-64.

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Copenhagen, December 2006.

Jørgen Søndergaard

SUMMARY

The present report studies the impact of reduced hearing in relation to labour-market attachment and working life. The study shows that reduced hearing contributes to the early retirement of Danes aged 50-64. There are clear differences between men and women, with regard to both the degree of hearing impairment and the consequences of the hearing problems. There are just over 1 million Danes who are 50-64 years old. Hearing problems in the population in this age group cause productivity losses of DKK 2.7 billion or approx. EUR 360 million on an annual basis.

The study also suggests that many people with impaired hearing are not aware of the impact of their hearing problems on their working life and social interaction in the workplace. When people develop hearing problems, the quality of their working life deteriorates in certain areas. It is the perceived deterioration of the quality of working life that causes people with impaired hearing to retire.

The report is based on a survey of a representative section of the Danish population aged 50-64. In addition, qualitative interviews have been conducted with 39 persons. The study includes both a measure of the functional hearing of the respondents and the results of an audiometric hearing test.

CHAPTER 1

INTRODUCTION

REDUCED HEARING

"I'm sorry, I didn't catch that." Thousands of people use phrases like this on a daily basis. And this has a great impact on themselves and their surroundings.

Communication is made difficult for persons with reduced or no hearing and it makes great demands on themselves and their surroundings. If people are unable to hear what is being said they risk missing important information, but they also risk exclusion from everyday small-talk and informal social interaction. Thus, reduced or no hearing can result in a considerable communication handicap in leisure life as well as at work. The issue of hearing problems is therefore somewhat different from that of many other functional impairments because it affects *communication,* and consequently other measures and initiatives are needed in order to include the hearing-impaired.

Work enables people to support themselves financially and it constitutes a clear financial incentive. But work also functions as one of society's most important social integrators. Furthermore, it is obviously also of great societal importance that each individual contributes to the maintenance of society.

If the circumstances for the hearing-impaired are improved, and if we succeed in retaining them in the labour market until they reach the

pensionable age, this would not only mean an improvement of the quality of their working life, but also result in huge savings to society. Previous research indicate that the potential economic gains to society of solving hearing-related problems would be great compared to the relatively little cost (Ehima, 1999; SIHI, 1999).

In this report we analyse the incidence of hearing problems among Danes aged 50-64. In addition, we examine the impact of reduced hearing on labour-market attachment and the quality of working life. Finally, we calculate the costs to society in connection with reduced hearing in this age group.

Hearing problems

Reduced hearing is a widespread disability. The share of hearing-impaired people in Denmark is approx. 16 per cent. For people of working age, the share is approx. 11 per cent (Clausen, 2003). About 5 per cent of the Danish population wear a hearing aid.

Hearing problems can be roughly divided into two different categories: conductive and perceptive (VCDDH, 2005; Phonak, 2005; Hain, 2006). Thus, the physiological problems in connection with hearing may vary considerably. But the extent of the consequences of hearing problems is also determined by legislation in this field as well as the organisation and reactions of the surroundings (WHO, 2001). Furthermore, individual and personal factors such as gender, age, lifestyle, habits and the ability to compensate for the hearing impairment play a role (Kricos, 2000; Bess et al., 1989). Whether someone has a handicap depends on the person and the situation, and a disabled person may seem handicapped in some situations and not in others (Wadensjö, 1985). All in all, a person's perception of his or her hearing loss is shaped in interaction with physiological, social and emotional factors (Hallberg, 1992; Hallberg & Carlsson, 1992b).

Acknowledging and accepting the hearing impairment

A significant aspect of the importance of reduced hearing is the acknowledgement process involved (Johnson & Danhauer, 2002; VCDDH, 2005; Hallberg, 1992). An acknowledgement process consists not only of *knowing* that one's hearing has changed, but also of *accepting* the condition and acting accordingly (Wu et al., 2004). According to Erving Goffman, identity is developed and maintained through interac-

tion with others, and individuals use different methods to maintain their presentation of the self. The driving force behind these processes is the person's desire to appear 'normal' and not to deviate from others (Goffman, 1959, 1964). Because of his or her hearing impairment the individual no longer appears normal and ordinary, but as a deviant. As a consequence, people with hearing-impairments may refuse to acknowledge their condition or try to avoid telling colleagues and acquaintances about their hearing impairment.

METHOD

This study is based on a survey of a representative section of the Danish population aged 50-64.[1] Data was collected in the spring of 2005. From a gross sample of 3,000 persons we obtained responses from 2,407 persons in total yielding a response rate of 80. This is very satisfactory. Apart form certain imbalances in terms of age and education, the respondents resemble the general public in the same age group. When we use the net sample to make estimations on the overall Danish population aged 50-64, the participants are weighted in relation to age and education.

Whereas previous studies have mainly dealt with the consequences of a hearing impairment for persons who are already being treated for hearing loss (Wilson et al., 1999), this report also focus on the implications for people who live with an untreated and possibly unacknowledged hearing impairment. Thus, the inclusion of persons with a *treated hearing loss*, persons with an *untreated hearing loss* and persons with *no hearing problems* in this study is unusual and contributes to making it relevant and relatively unique.

Qualitative interviews

In addition to the quantitative data, the study is based on qualitative interviews with 39 persons who all stated in the questionnaire that they had hearing problems. The interviews disclose the respondents' own experience of the impact of their hearing problems on their working life.

1. Personal data on 3,000 persons aged 50-64 was extracted by Statistics Denmark. This ensures that the gross sample is representative.

The interviews were conducted in the spring of 2006. The interviewees included both men and women, people in employment, people receiving disability pension and people receiving early-retirement benefits.

HEARING IMPAIRMENT MEASURES

Because we are dealing with a representative section of the Danish population aged 50-64, we had to collect information about the respondents' hearing and hearing problems, if any, for our analyses. Therefore, the questionnaire included a number of questions about the respondents' functional hearing in everyday life, and the respondents took an audiometric hearing test. The two methods of identifying hearing problems are described below.

Audiometric hearing measures

An audiometric hearing test measures how many decibels (sound intensity) it takes to perceive different tones – this is also called pure tone audiometry. The more decibels required, the more severe the hearing impairment. In this study the hearing threshold in dB HL is measured at 500, 1,000, 2,000 and 4,000 Hz. We used the ISO standardised method of medical classification of a hearing impairment (ISO, 1990).

This method is not without problems, however. Using an average hearing threshold at frequencies from 500 to 4,000 Hz allows for both low tone and high tone hearing loss within the speech range. Most people first lose their hearing in the high tone range, however (Toh et al., 2002). This means that they may hear low tones very well while having great difficulties with high tones. As the classification is based on an average hearing threshold for both low and high tones, their weighting is the same in the classification. This does not necessarily give the truest picture of the impact of the hearing impairment.

50 per cent of the information in normal speech is in the 1,600 to 4,000 Hz range. And as much as 70 per cent is in the range above 1,000 Hz. This means that the high tones are extremely important for understanding speech. If a person is unable to hear the high tones, a great deal of the information in the speech will be lost – even though the person hears the low tones very well (Pavlovic, 1987). High tone-related hearing problems can thus affect overall understanding enormously. As a

result, an average measure of all frequencies is not necessarily the most correct measure, because hearing loss predominantly affects the high tones first.

To solve this problem we decided to include a hearing classification involving only threshold values at 2,000 and 4,000 Hz. As it appears that the classification based only on the threshold values at 2,000 and 4,000 Hz has the strongest correlation with the respondents' labour-market attachment, the results for that measure are applied in the present report.

Table 1.1 shows the extent of hearing problems in the net sample.

Table 1.1

Hearing impairment classification based on threshold values at 2,000 and 4,000 Hz.

Class	Functional impairment	Average hearing threshold on best ear		Per cent	Number
		Over	Not over		
A	None		15 dB	31	740
B	Very mild	15 dB	25 dB	32	767
C	Mild	25 dB	40 dB	24	577
D	Moderate	40 dB	55 dB	9	217
E	Moderate-severe	55 dB	70 dB	3	67
F	Severe	70 dB	90 dB	0	9
G	Very severe/deaf	90 dB		1	13
Total				100	2,390

Measure for functional hearing

The big question is whether it is even possible to register and classify a hearing impairment clinically and to find an objective measure for it, because a lot of other factors may come into play in relation to how a person experiences his or her hearing.

As a result, it is difficult to determine how much the hearing-impaired person understands based on an audiometric hearing test alone. Instead, what is most important may be how the person *experiences* and *copes with* the hearing impairment. The functional hearing thus identifies several aspects concerning hearing problems in that a number of other factors beyond the purely factual hearing threshold are allowed to influence the responses. This might include how the hearing impairment is

coped with, the person's own acknowledgement of the hearing problem and the amount of dependency on hearing. The perceptive forms of hearing problems, where the perception of speech and the ability to distinguish words have deteriorated, are not captured by the audiometric test either. Two persons with the same measurements in the audiometric test may have varying degrees of hearing problems in everyday life and benefit differently from their hearing (Hällgren et al., 2005; Gatehouse & Noble, 2004).

In order to identify the functional hearing, the questionnaire includes a number of questions about everyday hearing problems. Persons wearing hearing aids have responded based on how their hearing works when wearing the hearing aid.

In response to the question *"Do you have reduced hearing to such an extent that you have difficulties following a conversation where several people are present?"* the vast majority of the respondents in the net sample state that they have no difficulties. 23 per cent have some difficulties whereas only 4 per cent have many difficulties.

The respondents were also asked a number of questions about their hearing in different listening situations. For example: *"Do you find it difficult to hear someone who talks loudly in a quiet room?"* and *"Do you hear well enough to use an ordinary phone?"*

The table below shows an index of the number of situations in which the respondents experience hearing problems.

Table 1.2
Classification of functional hearing characteristics. Percentage and number.

Functional hearing characteristics	Per cent	Number
0 – no hearing problems	56	1,352
1	27	646
2	10	236
3	5	128
4	1	29
5	0	4
6 – severely disabled	0	0
Total	100	2,395

Audiometrically measured hearing and functional hearing

There is a clear correlation between the audiometric hearing measurement and functional hearing characteristics in everyday life. Thus, 76 per cent of the respondents have no hearing problems according to either of the two measures, whereas 10 per cent have hearing problems according to both measures.

There are certain inconsistencies, however. 6 per cent of the respondents have no hearing problems according to the audiometric test, but they report functional hearing problems in several common listening situations. 8 per cent have a clear hearing impairment according to the audiometric test, but they themselves experience few hearing problems in everyday life.

The group of individuals who are hard of hearing according to the audiometric test, but who do not report significant functional hearing problems probably mainly comprises two different types. Firstly, those who have not acknowledged that they have a hearing loss, and secondly, those who have acknowledged their hearing impairment, acted on it and compensated for instance by getting a hearing aid.

The fact that a certain number of individuals in the net sample say they have several problems in everyday life while not being registered as hearing-impaired in the audiometric test may be due to the way a hearing impairment is classified in the audiometric hearing test (Noble & Gatehouse, 2004). In addition, the perceptive forms of hearing problems are not necessarily revealed in the audiometric hearing test. The social and psychological characteristics of each individual are also allowed to influence the functional hearing. The difference between the two hearing measures substantiates the importance of having several measures that capture different aspects of hearing.

Men's hearing is not as good as women's hearing

The table below shows the share of respondents with hearing problems according to the different hearing measures. The table also shows the distribution of other more specific types of hearing problems. In addition, it appears that in general men have more hearing problems than women.

Table 1.3

Proportion of net sample with different hearing problems broken down by gender. Percentage and number.

	Men	Women	All	Number
Minimum a mild clinically measured hearing impairment	48	26	37	879
Many/some difficulties following a conversation	32	22	27	653
Problems in 2-5 listening situations	18	15	17	397
Tinnitus	10	4	7	175
Reduced ability to distinguish words	6	3	4	105
Hypersensitivity to noise	3	4	3	79
Other hearing problems	3	3	3	72
Ménière	1	0	1	12
Hearing aid	7	4	5	131

Of the 131 individuals who state that they have been fitted with a hearing aid, 18 per cent 'never' use it and 13 per cent 'rarely' use it. 15 per cent use it 'occasionally', 18 per cent 'usually' use it and 36 per cent 'always' use it. Thus, a total of 4.4 per cent of the net sample *use* a hearing aid at least occasionally. Women use the hearing aids issued as often as men do.

CHAPTER 2

EARLY RETIREMENT

This chapter centres on those persons who have chosen to retire early from the labour market, either under a disability pension scheme or an early retirement benefit scheme – and the role their hearing impairment plays in their retirement.

Everyone over the age of 60 who has been a member of an unemployment fund for 25 years within the last 30 years and who has paid early retirement contribution for a corresponding period is entitled to receive early retirement benefits. On the other hand, disability pension is granted to people who, for physical, mental or social reasons, are unable to work and support themselves. Hearing problems will not always be sufficient reason to be awarded disability pension, but in addition to other health and social problems they may contribute to an overall reduced ability to work that excludes the individual from the labour market.

11 per cent of the persons in the net sample receive disability pension while 14 per cent receive early retirement benefits. There are more women than men who receive disability pension and early retirement benefits.

REGRESSION ANALYSIS

Using regression analysis, we have examined the impact of hearing problems on early retirement from the labour market. The regression analysis allows us to analyse several different variables at the same time and thus to control the effects of a number of underlying variables on the dependent variable.

We specify values for the maximum likelihood estimate, standard error, odds ratio and p-value in the regression analysis, but in the following we will concentrate on the outcome of the odds ratio and the p-value.

The concepts of odds and odds ratio are best known from sports pools. If a team's odds for winning are 3 to 1, this means that the team concerned is estimated to have a 75 per cent probability of winning the game. The other team is estimated to have a 25 per cent probability of winning. A similar calculation applies in relation to the results of the regression analyses. In the regression analysis tables, however, the parameter values are presented as odds ratios. This means that for the category concerned, for instance the odds of being on disability pension, the odds are compared to those of the reference category. If self-employed persons is a reference category, an odds ratio greater than 1 for unskilled workers means that the odds that the latter are on disability pension are greater than for the self-employed. An odds ratio of less than 1 means that they are less likely to be on disability pension. For example, the odds ratio for unskilled workers may be 1.50. This means that the odds that unskilled workers are on disability pension are 50 per cent greater than for the self-employed.

On the other hand, the p-value or significance level indicates the probability that the result stated occurred by chance. Normally, a significance level of 5 per cent is applied. So if the p-value is greater than 0.05, the correlation is rejected as insignificant.

Separate analyses were conducted for men and women as the retirement patterns of the two genders vary greatly. *Both* persons on disability pensions and persons on early retirement benefits were included in the analysis as were persons who are still in active employment. We chose this method in order to be able to examine any potential correlation between the two retirement schemes – what leads to the choice of one over the other, and what bearing does hearing problems have on this

choice. The findings are illustrated in separate tables, however, to make them easier to understand for the reader.

The following describes the retirement pattern for men. First, we look at the correlation between reduced hearing and disability pension. We then examine the correlation between reduced hearing and the early retirement benefit scheme. Afterwards we look at the results for women. Here, we also examine the correlation between reduced hearing and disability pension as well as between hearing and early retirement benefits. The tables only show the characteristics that are significant in relation to the type of retirement in question.

MEN'S EARLY RETIREMENT

Men and disability pension

The hearing influences whether men receive disability pension. Age, marital status, occupation, educational background and health problems also play a part. The importance of these characteristics will not be reviewed in the following, however, only it should be noted that obviously these factors are of importance, too. Table 2.1 shows the odds that the men are on disability pension versus being in active employment.

Table 2.1

Logistic regression analysis of factors that influence men's disability pension.

Disability pension	Maximum likelihood estimate	Standard error	Odds ratio	P-value
Constant	-7.8095	1.07		***
Age 50-64	0.1790	0.07	1.1960	**
Marital status:				
Married/in partnership	Reference			
Divorced/separated	1.2986	0.37	3.6640	***
Widower	1.7447	0.79	5.7240	*
Unmarried	1.4664	0.38	4.3335	***
Occupation:				
Self-employed/assisting	Reference			
Salaried employee/official	0.1660	0.41	1.1806	-
Skilled	1.2504	0.47	3.4916	**
Unskilled	0.7128	0.47	2.0397	-

Disability pension	Maximum likelihood estimate	Standard error	Odds ratio	P-value
Education:				
Basic general education	1.1929	0.37	3.2966	**
Upper secondary level	2.1608	0.84	8.6781	*
Vocational	Reference			
Short-cycle higher education	0.7579	0.57	2.1339	-
Medium-cycle higher education	0.2427	0.50	1.2747	-
Long-cycle higher education	1.1935	0.51	3.2987	*
Health:				
0-10 health problems	1.0075	0.16	2.7387	***
Problems with…				
Back or neck	-0.6096	0.31	0.5436	*
Dyslexia	-1.2494	0.39	0.2867	**
Diseases	0.7342	0.34	2.0838	*
Hearing:				
Clinically measured hearing impairment	0.0350	0.02	1.0357	*
Functional hearing characteristics	0.6683	0.34	1.9509	*
Many difficulties in conversation	Reference			
Some difficulties in conversation	-1.2999	0.48	0.2726	**
No difficulties in conversation	-0.6642	0.49	0.5147	-
Clinically measured hearing*Health	-0.0090	0.00	0.9910	*

Note: - not significant; * P<0.05; ** P<0.01; ***P<0.001. LR chi2 (44) =621.76. p=0.0001.
Number of observations: 1,138.

Clinically measured hearing impairment

Both the clinically measured hearing and the two measures of functional hearing in everyday life influence the likelihood that the men are on disability pension.

The scale of clinically measured hearing impairment ranges from -10 to 90 dB. The odds of being on disability pension increase by 3.6 per cent for each value on the scale. This means that the odds of a man with a hearing threshold value of, say, 60 and thus a moderate-severe hearing impairment being on disability pension are 178.5 per cent greater than the odds of a man with a hearing threshold value of 10 and thus no hearing impairment. This means that the objective hearing level is of importance – the greater the hearing impairment, the greater the probability of disability pension, regardless of whether the hearing impairment is acknowledged or not, and regardless of how the person copes with the hearing impairment in everyday life.

Interaction between clinically measured hearing and health

It also appears that the interaction between clinically measured hearing and health influences whether or not the men choose to go on disability pension. The fact that the parameter estimate is negative means that in the cases where a man is in very poor health with several different concurrent health problems, that man's hearing will not have the same impact on the choice of receiving a disability pension as in cases with fewer health problems.

Functional hearing impairment

The odds of being on disability pension are 95 per cent greater for men who have stated problems in more than one listening situation in everyday life than for men who have only stated problems in a single situation or none at all. At the same time, the odds of being on disability pension are significantly greater for men with *many* difficulties following a conversation than for men with only *some* problems.

This means that clinically registered hearing impairment is not the only factor to have an impact on retirement from the labour market under a disability pension scheme. The way individuals cope with their hearing problems is also of importance. Thus, men whose audiometric tests do not show a particular hearing impairment still have a higher probability of being on disability pension if they have a functional hearing impairment. Consequently, the perception of the hearing problem and the ability to understand speech also influence this form of early retirement. If men have both a hearing impairment according to the audiometric test *and* experience a reduction of their functional hearing, the probability that they are on disability pension increases even more.

Men and early retirement benefit

Very few characteristics are associated with men's choice of the early retirement benefit scheme. Only age, occupation and education play a significant part. Thus, reduced hearing does not have any direct effect on men's choice of early retirement benefits. Table 2.2 shows the odds of men choosing early retirement benefits.

Table 2.2

Logistic regression analysis of factors that influence men's choice of early retirement benefit.

	Maximum likelihood estimate	Standard error	Odds ratio	P-value
Constant	-13.6150	1.69		***
Age 50-64	0.6240	0.10	1.8665	***
Under or over the age of 60	2.5824	1.11	13.2289	*
Occupation:				
Self-employed/assisting	Reference			
Salaried employee/official	0.9193	0.41	2.5075	*
Skilled	1.6653	0.47	5.2873	***
Unskilled	1.6774	0.48	5.3339	**
Education:				
Basic general education	Reference			
Upper secondary level	-0.9090	1.29	0.4029	-
Vocational	-0.6199	0.38	0.5380	-
Short-cycle higher education	0.6460	0.64	1.9078	-
Medium-cycle higher education	-0.7914	0.52	0.4532	-
Long-cycle higher education	-1.2616	0.61	0.2832	*

Note: - not significant; * P<0.05; ** P<0.01; ***P<0.001. LR chi2 (44) =621.76. p=0.0001.
Number of observations: 1,138.

Clinically measured hearing impairment

It appears from the above regression analysis that hearing has no bearing on the choice of the early retirement benefit scheme. However, if we conduct a separate regression analysis involving only men who receive early retirement benefits and men who are still in active employment, this result is modified.[2] Such an analysis shows that reduced hearing according to the audiometric test influences the choice to receive early retirement benefits in that the odds go up by 2 per cent for every decibel by which the hearing deteriorates (p=0.038). The functional hearing, on the other hand, has no statistical correlation with the choice of retiring early under an early retirement benefit scheme.

So there is a difference between the model that includes all three conditions – disability pension, early retirement benefits and active employment – and the model that includes only active employment and early retirement benefits. In 'the real world', some will be prevented

2. Consequently individuals on disability pension are excluded from the calculation.

from leaving the labour market under a disability pension scheme, and for this group the early retirement benefit scheme is a more obvious option. Statistically, this 'exclusion effect' may not be properly represented in the estimation including three conditions. The logistic model used has the well-known characteristic: 'independence of irrelevant alternatives' (Nash, 1950). In our case this means that the likelihood of choosing early retirement benefits versus the likelihood of being in active employment is not influenced by the possibility of going on disability pension. This assumption may very well be unreasonable, and it may be the reason why a positive correlation between hearing impairment and early retirement benefits is not estimated in the model including three conditions. The statistical calculation that only includes the possibilities of being in active employment or on early retirement benefits allows, to a greater extent, for the fact that the option of disability pension is not available to everyone.

On the other hand, the three-condition model is a good illustration of the point that reduced hearing primarily influences men's retirement under a disability pension scheme. Thus, the three-condition model is useful because we are certain that the whole population is included and not just a subpopulation that may have special characteristics.

Interaction between clinically measured hearing and health

The interaction between health and reduced hearing measured in the audiometric test also appears to be significant in the simpler regression analysis, but with a negative parameter estimate. This means that a hearing impairment does not have the same bearing on the choice of receiving early retirement benefits for men with several health problems.

Influence of hearing on men's early retirement

Hearing problems increase the likelihood of men's early retirement from the labour market under the disability pension scheme as well as under the early retirement benefit scheme. The strongest correlation is seen in relation to disability pension. Here, it is not only a clinically measurable hearing impairment but also the functional problems in everyday life that are of importance. In this case both measures of functional hearing are significant.

The primary reason why no apparent correlation is seen between reduced hearing and the early retirement benefit scheme is the interac-

tion between the two retirement schemes. Men with severe hearing problems will have retired under a disability pension scheme before they reach the age of 60 and are eligible for the early retirement benefit scheme. This means that the men in the net sample who have the most severe hearing impairment will not be able to choose the early retirement benefit scheme, because they are already excluded from the labour market at the age of 60. However, some correlation between reduced hearing and the choice of retirement under the early retirement benefit scheme is seen. Although a good many of the men with the most severe hearing problems will have left the labour market by the age of 60, this does not apply to all of them. Among this group the likelihood of choosing early retirement benefits increases with the severity of the hearing impairment. Thus, the analyses are excellent illustrations of the important difference between the types of men who choose/are eligible for the two retirement schemes.

WOMEN'S EARLY RETIREMENT

We have conducted the same regression analysis for women as for men, where we compare the likelihood of being on disability pension or early retirement benefits to the likelihood of still being in active employment depending on a number of person-specific characteristics.

Women and disability pension

Age, marital status, occupation and health influence whether women are on disability pension. On the other hand, hearing does not have a direct significant impact on women's reception of disability pension.

Table 2.3

Logistic regression analysis of factors that influence women's disability pension.

	Maximum likelihood estimate	Standard error	Odds ratio	P-value
Constant	-5.3113	0.64		***
Age 50-64	0.1191	0.05	1.1264	*
Under or over the age of 60	0.9184	0.40	2.5053	*
Marital status:				
Married/in partnership	Reference			
Divorced/separated	1.1536	0.28	3.1697	***
Widow	0.7442	0.44	2.1047	-
Unmarried	0.7879	0.45	2.1989	-
Occupation:				
Self-employed/assisting	Reference			
Salaried employee/official	-0.0470	0.41	0.9541	-
Skilled	0.2089	0.56	1.2323	-
Unskilled	0.9955	0.44	2.7061	*
Health:				
0-10 health problems	0.6088	0.07	1.8383	***
Problems with skin disease/allergy	-0.6449	0.27	0.5247	*

Note: - not significant; * P<0.05; ** P<0.01; ***P<0.001. LR chi2 (36) =785.20. p=0.0003. Number of observations: 1,117.

Clinically measured hearing impairment

The statistical issues that were pointed out in connection with the analysis of men's early retirement from the labour market and the simultaneous incorporation of the two early retirement schemes also apply to the analysis concerning women's early retirement. The selection mechanism is different for women, however, as not all women have been in the labour market and paid early retirement contributions for a sufficient number of years.[3] Thus, not all women are able to choose the early retirement benefit scheme. So if we conduct a regression analysis including only women who are either in active employment or receiving disability pension, while women receiving early retirement benefits are excluded from the analysis, it appears that hearing does in fact influence the granting of disability pension to some extent. Thus, the odds of being on

3. This situation applies more rarely to men.

disability pension increase by 2 per cent for every step on the threshold scale by which the hearing deteriorates. Functional hearing is not significant.

Hearing aids

There is a clear correlation between not wearing a hearing aid and the odds of receiving disability pension. As a consequence, among women with the same degree of hearing impairment, those who do not wear a hearing aid are much more likely to receive disability pension than those who do. The significance of a hearing aid increases with the degree of hearing impairment.

Women and early retirement benefit

Precisely as was the case with men, age, occupation and education influence women's choice of the early retirement benefit scheme. Health, on the other hand, is irrelevant. There is, however, a correlation between reduced hearing and the choice of early retirement benefits.

Table 2.4

Logistic regression analysis of factors that influence women's choice of early retirement benefit.

	Maximum likelihood estimate	Standard error	Odds ratio	P-value
Constant	-9.8459	0.95		***
Age 50-64	0.5679	0.08	1.7646	***
Under or over the age of 60	2.0674	0.59	7.9039	***
Occupation:				
Self-employed/assisting	Reference			
Salaried employee/official	0.6004	0.35	1.8228	-
Skilled	0.9744	0.51	2.6496	-
Unskilled	0.9114	0.41	2.4879	*
Education:				
Basic general education	Reference			
Upper secondary level	-1.0551	0.76	0.3482	-
Vocational	-0.6403	0.32	0.5271	*
Short-cycle higher education	-0.6091	0.44	0.5439	-
Medium-cycle higher education	-1.2495	0.41	0.2866	**
Long-cycle higher education	-2.0268	0.61	0.1318	**

	Maximum likelihood estimate	Standard error	Odds ratio	P-value
Hearing:				
Clinically measured hearing impairment	0.0185	0.01	1.0187	*
Functional hearing characteristics	1.2915	0.50	3.6382	*
Functional hearing characteristics*Health	-0.5170	0.19	0.5963	**

Note: - not significant; * P<0.05; ** P<0.01; ***P<0.001. LR chi2 (36) =785.20. p=0.0003.
Number of observations: 1,117.

Clinically measured hearing impairment

The odds of being on early retirement benefits increase by 1.8 per cent for women for every upward step on the hearing threshold in the audiometric hearing test.

Functional hearing impairment

The odds of being on early retirement benefits are 264 per cent higher for women who experience problems in two or more everyday listening situations than for women who experience problems in a single listening situation at the most.

Interaction between functional hearing and health

In addition, the interaction between functional hearing characteristics and health is significant and with a negative estimate. This means that functional hearing characteristics are only important in relation to the choice of early retirement benefits for women who are in relatively good health. If a woman has many health problems, they are decisive for whether she is still working and not the reduced functional hearing.

Among women *without* any health problems, those with functional hearing problems are more likely to chose early retirement benefit than those without hearing problems. However, it is highly unlikely that women with *many* health problems and severe hearing problems receive early retirement benefits. This is probably due to the selection that takes place in the population of women before they reach an age that allows them to receive early retirement benefits. Those women who have been inconvenienced the most by their health problems are likely to have retired before they reach the age of 60. On the other hand, the remaining women with health problems want, to a greater extent, to stay in active employment.

Hearing aid

Among women with the same degree of hearing impairment the likelihood of choosing early retirement benefits decreases if they wear a hearing aid. The greater the hearing impairment, the more important is the use of a hearing aid.

Influence of hearing on women's early retirement

So hearing does influence women's choice of receiving early retirement benefits. At the same time, hearing is also a factor in the granting of disability pension. The primary reason why hearing plays a more important part in relation to the early retirement benefit scheme is that it is a more 'attractive' form of retirement than disability pension. Since most women do not develop hearing problems until they are in their 60s, this means that they will choose early retirement benefits rather than disability pension. Not all women are eligible for early retirement benefits, however. Analyses show that for those women who are not eligible for early retirement benefits, the likelihood of them going on disability pension increases with the deterioration of their hearing.

Gender-related differences in impact of reduced hearing

Why do we see gender-related differences in the retirement patterns? We know that men generally have more hearing problems than women, and that these problems set in earlier for men than for women. This means that whereas most women in the study will not be inconvenienced by their hearing until after they have reached the age of 60, many of the men under 60 will have hearing problems. Some of these men will therefore be forced to go on disability pension. The somewhat more moderate impact of hearing on men's choice to receive early retirement benefits is probably due to the fact that the men who have the most severe hearing impairments and who have been extremely inconvenienced by their hearing problems will have gone on disability pension before they reach the age of 60. Thus, the men who are most exposed in terms of early retirement will already have been 'sorted out' when they reach the age when they are eligible for early retirement benefits.

Only few women have a hearing impairment that is severe enough to lead to disability pension before they reach the age of 60. Therefore, the impact of hearing problems in relation to early retirement benefits is greater for women. To some extent, hearing is a factor, how-

ever, in relation to the distribution of disability pension for those women who are not eligible for early retirement benefits.

At the same time, the findings indicate that men *feel* less inconvenienced by their hearing impairment and are better able to *cope* with it. Men also appear to be more reluctant to acknowledge a beginning hearing loss (Kricos, 2000; Uchida et al., 2003). In addition, the different degrees of influence of reduced hearing between the two genders may be due to different dependencies on hearing and the ability to communicate without problems with colleagues and surroundings. Women often perform other roles on the labour market and to a greater extent have jobs where communication is a necessity. If this is the case, reduced hearing will be experienced as and *constitute* a bigger handicap for women than for men (Bingfors & Isacson, 2004; Kricos, 2000). Finally, it is possible that men are subject to other extraneous social and societal influences that require men to stay in active employment longer. Established psychological and social expectations may contribute to shaping their view of their health and the consequences of their health problems (Bingfors & Isacson, 2004; Hoffmann & Tarzian, 2001; Unruh, 1996).

CHAPTER 3

WORKING LIFE

HOW HEARING PROBLEMS IMPACT WORKING LIFE

There is statistical evidence to support the conclusion that reduced hearing influences the retirement patterns of both men and women, albeit in different ways.

When we ask people with hearing impairments whether their retirement had anything to do with their hearing, the vast majority of respondents deny this – even though they have acknowledged having hearing problems. This pattern is seen in both the quantitative survey and in the qualitative interviews. Asked directly about the impact of their hearing problems on their working life, the interviewees instead reply: "A handicap? – No. I can always just ask. Or pretend they weren't talking to me" or "The hearing impairment didn't cause any problems at work – at least nothing that couldn't be laughed off."

But then how do we explain the correlation between reduced hearing and early retirement that was demonstrated in the previous chapter? There is some indication that the impact of hearing on working life is of a very indirect nature, i.e. hearing is not perceived as the direct cause of the retirement, but it does have a negative impact on working life.

The questionnaire included a number of questions about different aspects of working life without any relation to the hearing of the respondents. We asked them to assess aspects concerning their working life and subsequently analysed the responses according to the hearing of the respondents. It appears from this analysis that persons with hearing problems experience and benefit differently from their working life than persons without hearing problems.

Relations with the management

Individuals with functional hearing problems experience more often than persons with normal hearing that they don't have any influence on their job assignments ($p=0.0001$). Furthermore, they more often feel in doubt about their job assignments and they are less often consulted by their superiors in questions regarding their job assignments ($p=0.0425$ and $p<0.0001$).

Their relations with the management seem to improve, and hearing-impaired individuals experience much more support and encouragement from their superiors if they tell about their hearing problems ($p=0.0398$). Here, it should be noted that individuals who basically have good relations with their superiors and who are already experiencing a considerable measure of support and encouragement will also be more inclined to tell their superiors about their hearing problems.

Social working environment

Although the vast majority of both individuals with hearing impairments and those with normal hearing have many good colleagues at work, it seems that the hearing-impaired do not have as positive an experience of their social working environment as individuals with normal hearing. Thus, among persons with reduced functional hearing characteristics there is an over-representation of persons who have experienced unpleasant teasing at work.

Table 4.1

Individuals who are or have previously been working with others broken down by whether they experience unpleasant teasing at work, according to functional hearing characteristics. Percentage and number.

	Unpleasant teasing			
	Yes	No	Total	Number
Functional hearing characteristics				
0 – no problems	6	94	100	1,093
1	8	92	100	500
2	11	89	100	185
3	21	79	100	97
4	18	82	100	22
5 – severe problems	0	100	100	2

χ^2=31.81, df=5, p<0.0001; γ=-0.29, p<0.0001.

This feeling of not being integrated socially at work is supported by the fact that persons with functional hearing problems feel more lonely at work and experience less support and encouragement from their colleagues compared to persons with normal hearing (p=0.0073 and p=0.0159).

Mental fatigue at the end of the working day

Individuals with functional hearing problems also feel mentally fatigued when they get home from work more often than persons without hearing problems.

Table 4.2

Net sample broken down by feeling of mental fatigue at the end of the working day, particularly according to functional hearing characteristics. Percentage.

	Functional hearing characteristics	
	0-1 problem(s)	2-5 problems
Mental fatigue		
Yes	8	17
Yes, sometimes	33	30
No	59	53
Total	100	100
Percentage basis	1,971	383

χ^2= 29.64 df=2, p<0.0001; γ=-0.17, p=0.0008.

Retirement

When we ask the respondents to state the reason for their retirement, hearing-impaired individuals state 'push factors' more often than individuals without hearing problems. In contrast, individuals with normal hearing state 'pull factors' as the reason for their retirement more often than individuals with hearing problems. Similar correlations apply when we ask individuals who are still in active employment to state their expected reason for retirement. One group states that they are forced out of the labour market whereas the other group states that conditions outside the labour market make them retire.

The indirect effect

When we compare the results of the statistical analysis with the respondents' own experience of working life, there are many indications that the quality of the working life deteriorates with the onset of hearing problems. But the person with the hearing impairment is often unaware of this effect. And presumably it is the experience of deteriorated quality of working life that makes hearing-impaired individuals retire without being aware of the impact of hearing.

CHAPTER 4

SOCIO-ECONOMIC COSTS RELATED TO REDUCED HEARING

Reduced hearing contributes to early retirement from the labour market. However, hearing problems do not only affect the individual with a hearing impairment. Hearing problems also result in increased economic costs for society.

In this chapter we present a rough estimate of the costs to society caused by hearing problems in the Danish population aged 50-64. We use the *cost-of-illness* (COI) analysis in our calculations.

Cost-of-illness

A COI analysis provides information about the consumption and loss of resources in connection with a specific illness or functional impairment. These resources or costs take two forms in the analysis: direct and indirect.

The *direct* costs include the socio-economic treatment and prevention costs in connection with the health problem. The questionnaire does not include questions about the net sample's use of hospital services, general practitioners or other sources of treatment, however. Because this information is necessary to be able to estimate the direct costs related to reduced hearing, we have chosen to disregard this part of the COI analysis and to concentrate solely on the indirect costs related to a hearing loss.

The *indirect* costs include the value of lost productivity and the 'pain and suffering' of the hearing-impaired as a result of the hearing loss. The psychosocial effects of hearing loss are very difficult to assess and measure, however. As a consequence, analyses of indirect costs often focus on the value of lost productivity resulting from the impairment. To measure lost productivity we use the human capital approach that is also the most commonly used in COI analyses (Rice, 1966, 2000; Becker, 1964). Here, productivity is briefly described as a measure of the rate of employment multiplied by an adequate rate of pay, i.e. the effect of the hearing problems in relation to disability pension, the choice of early retirement benefit and the rate of unemployment. In addition, we include the effect of reduced hearing on the average weekly working hours. We only look at the consequences in a single year.

VALUE OF LOST PRODUCTIVITY

To get a measure of lost productivity due to hearing problems we calculate the total earned income in two societies – the *real* society with the occurrence of varying degrees of hearing impairment – and a *hypothetical* society where there are no hearing problems. The difference between the two amounts will thus equal the maximum lost income due to hearing problems.

The calculation is made in two stages. First, the value of lost productivity is calculated among the participants in this study. An estimate is then made for the entire Danish population aged 50-64.[4]

Findings

Our calculations are based on an estimate of whether or not the respondents are employed. As in chapter 2, we divide the respondents into men and women, and we use more or less the same explanatory variables as in that chapter, cf. appendix tables 4.1 and 4.2. The parameters concerning reduced hearing are insignificant for men, but significant for women. The various degrees of hearing impairment and hearing problems are

4. As pointed out earlier, the net sample is not representative with regard to education and age distribution of the 50 to 64-year-olds. Consequently, these two parameters will be weighted in the calculations.

incorporated as they appear in the study. The employment probability can then be calculated for each person in the net sample.

In the alternative or hypothetical situation where the existence of hearing problems is excluded, we assume that the functional hearing is problem-free.[5] Functional hearing is thus put equal to 0 for everyone. Once more, the employment probability is calculated for each person in the net sample.

The average value of the difference between the two calculations constitutes the employment gain that would be the result if all functional hearing problems disappeared. The loss of productivity in connection with hearing problems is thus calculated as the gain from not having them.

The value of the employment gain for the entire population aged 50-64 is calculated via the total earned income among that age group. The calculation is made separately for men and women. The relevant distribution of earned income appears from table 4.1.

Table 4.1

Total earned income of the population broken down by gender, 2003 (DKK 1,000).

	Men	Women	Total
Aged 50-64	139,176,602	84,975,684	224,152,286

Source: Statistics Denmark (2006b).

The labour market gain from eliminating men's hearing problems is calculated as the difference in employment probability multiplied by the pay/salaries of the men aged 50 to 64. A similar calculation is made for women. The results appear in table 4.2.

5. Problem-free hearing means hearing problems in no more than one everyday listening situation.

Table 4.2

Labour market gain from an increased number in employment if functional hearing problems did not exist among the 50 to 64-year-olds.

Men	
Employment proportion, including hearing problems	0.775
Employment proportion, excluding hearing problems	0.776
Increase without functional hearing problems	0.001559
Gain for men, DKK million	217
Women	
Employment proportion, including hearing problems	0.605
Employment proportion, excluding hearing problems	0.612
Increase without functional hearing problems	0.007257
Gain for women, DKK million	617
Both genders	
Total gain, DKK million	834

According to the table, the employment probability increases by 1.559 and 7.257 per thousand for men and women, respectively. Thus, the indirect costs of the COI analysis, due to disability pension, early retirement benefits or unemployment, constitute maximum DKK 834 million – corresponding to approx. EUR 112 million.

Calculation including hours

It is, however, not only employment participation that is affected by hearing problems. On average, individuals who have reduced hearing work fewer hours per week than individuals with no hearing problems.

There are significant similarities between the estimations of working hours and the estimations of employment probability: The functional hearing characteristics are generally more important than the clinically measured hearing impairment, and they are more important for women than for men, cf. Appendix tables 4.3 and 4.4.

Table 4.3 shows the overall effect of improved functional hearing compared to employment probability *and* working hours. Since we know that on average the level of education is somewhat lower for persons with hearing problems and that their distribution in terms of occupation differs slightly, the calculations are weighted in relation to educational background, which adjusts for the somewhat lower income from employment of hearing-impaired persons than of the population in general.

Table 4.3

Labour market gain from an increased number in employment and changed working hours if functional hearing problems did not exist among the 50 to 64-year-olds – adjusted for disparities in pay.

	Including hearing problems	Excluding hearing problems	Change	Relative increase
Men				
Employment				0.001559
Average working hours for men in employment	39.74	39.92	0.17	
Hours, employment and pay				0.00417
Women				
Employment				0.007257
Average working hours for women in employment	34.12	34.62	0.51	
Hours, employment and pay				0.02455
Both genders				
Value of gain in DKK million				2,667

Incorporation of the model for working hours and disparities in pay means that the estimate of the labour-market 'loss' due to hearing problems more than triples to DKK 2,667 million or approx. EUR 360 million.

Loss of full-time jobs

But what does DKK 2,667 million in lost productivity actually correspond to? To explain the amount, the DKK 2,667 million can be converted into the number of full-time jobs in Denmark that are lost due to hearing problems in the section of the population studied. The persons aged 50-64 have an average annual income of approx. DKK 237,400 (Statistics Denmark, 2006c). By dividing the DKK 2,667 million in lost productivity by the average earned income of DKK 237,400 we get an estimated loss of full-time jobs of approx. 11,234 on a national basis.

At an estimated loss of 11,234 full-time jobs on a national basis, hearing problems will cause a loss of approx. 104 full-time jobs in a medium-sized town with a population of about 50,000.[6] In a small town with a population of about 10,000, the loss of full-time jobs due to hearing problems among persons aged 50-64 will be approx. 21. These are

6. In 2003, the Danish population was 5,383,507 (Statistics Denmark, 2006a).

rough distribution estimates and they do not take into account the different distributions according to age, gender and level of education that exist in different local authority areas.

It is important to emphasise that, firstly, this number reflects a hypothetical situation where hearing problems among persons aged 50-64 have been eliminated. Secondly, the loss of 11,234 full-time jobs does not reflect a potential number of 'new' jobs that could be immediately filled as a result of the elimination of hearing problems. The figure is calculated based on differences in weekly working hours between persons with normal hearing and persons with a hearing impairment – and consequently includes a loss in earned income for persons who are in employment but at reduced working hours. Thus, the 11,234 full-time jobs serve primarily to explain the loss of productivity of DKK 2,667 million.

BEST ESTIMATE OF EFFECT DESPITE UNCERTAINTY

The findings presented above are based on the estimates of four different regression analyses. These estimates are subject to much uncertainty, however. This means that if the model is fundamentally correct, the calculated labour-market effects may very well be greater or smaller than shown above.

Despite the uncertainty, it is worth remembering that the estimates described above are the best possible estimates of an effect.

CHAPTER 5

CONCLUSION

Our analyses have shown that hearing problems are a contributing factor in early retirement and a deterioration of the quality of working life. However, the vast majority of people with hearing-impairments deny that their hearing problems have influenced their early retirement from the labour market in any way. Consequently, there is a strong indication that hearing mainly has an indirect effect on labour market attachment. The onset of hearing problems causes – in combination with other factors – a deterioration of the quality of working life. This overall deterioration of working life is what ultimately leads to early retirement.

The results of the study make demands on various bodies to be aware of the consequences of reduced hearing – not only for the sake of the individual, but also for society in general. First of all, prevention is better than symptom treatment. Thus, it is important to continue the efforts to reduce noise nuisance at work and in the public domain. But once hearing problems have set in, they should be alleviated as much as possible in a joint effort by central government, the workplace, colleagues and the person with the hearing impairment. The allocation of technical aids can be improved. Acoustics should be taken into account when fitting out the workplace. And colleagues and the management should seek to alleviate the problems of the person with a hearing impairment as much as possible. The hearing-impaired also have a responsibility, though, to not only acknowledge their reduced hearing, but also

to accept it and the limitations it may impose on their relationships with other people. Thus, the individual's reaction to their hearing problems is of great importance for the consequences.

APPENDICES

Appendix table 4.1

Logistic regression of factors that influence men's rate of employment.

In employment	Maximum likelihood estimate	Standard error	Wald Chi-Square	P-value
Constant	3.6629	0.4151	77.8719	<.0001
Age 50-64	-0.2057	0.0429	22.9798	<.0001
Under or over the age of 60	-0.5847	0.3186	3.3672	0.0665
Marital status:				
Married/in partnership	0.6965	0.1950	12.7570	0.0004
Divorced/separated	-0.1096	0.2510	0.1906	0.6624
Widower	-0.2658	0.4748	0.3136	0.5755
Unmarried	Reference			
Occupation:				
Self-employed/assisting	0.8817	0.1940	20.6573	<.0001
Salaried employee/official	0.1707	0.1437	1.4114	0.2348
Skilled	-0.5905	0.1750	11.3842	0.0007
Unskilled	Reference			
Education:				
Basic general education	-0.0695	0.2312	0.0903	0.7638
Upper secondary level	-0.4195	0.5052	0.6897	0.4063
Vocational	0.3807	0.1777	4.5906	0.0321
Short-cycle higher education	-0.1200	0.3021	0.1579	0.6911
Medium-cycle higher education	0.0544	0.2336	0.0543	0.8157
Long-cycle higher education	Reference			
Health:				
0-10 health problems	-0.4577	0.0577	62.9239	<.0001
Problems with skin diseases	0.4982	0.2223	5.0214	0.0250

In employment	Maximum likelihood estimate	Standard error	Wald Chi-Square	P-value
Hearing:				
Clinically measured hearing impairment	-0.00011	0.00594	0.0003	0.9859
Functional hearing characteristics	-0.4174	0.3390	1.5166	0.2181
Functional hearing characteristics*Health	0.1207	0.1024	1.3902	0.2384

N=1,141.

Appendix table 4.2

Logistic regression of factors that influence women's rate of employment.

In employment	Maximum likelihood estimate	Standard error	Wald Chi-Square	P-value
Constant	4.3000	0.4001	115.4931	<.0001
Age 50-64	-0.2292	0.0411	31.0622	<.0001
Under or over the age of 60	-0.9296	0.2952	9.9194	0.0016
Marital status:				
Married/in partnership	0.3643	0.1485	6.0141	0.0142
Divorced/separated	-0.3600	0.1971	3.3352	0.0678
Widower	0.2253	0.2684	0.7046	0.4013
Unmarried	Reference			
Occupation:				
Self-employed/assisting	0.4262	0.2041	4.3611	0.0368
Salaried employee/official	0.2934	0.1417	4.2879	0.0384
Skilled	-0.2214	0.2408	0.8459	0.3577
Unskilled	Reference			
Education:				
Basic general education	-0.8013	0.2148	13.9091	0.0002
Upper secondary level	0.2436	0.5216	0.2181	0.6405
Vocational	-0.3578	0.1755	4.1565	0.0415
Short-cycle higher education	-0.2160	0.2408	0.8048	0.3697
Medium-cycle higher education	0.0623	0.2152	0.0838	0.7722
Long-cycle higher education	Reference			
Health:				
0-10 health problems	-0.4088	0.0512	63.8042	<.0001
Problems with skin diseases	0.5536	0.2096	6.9766	0.0083
Hearing:				
Clinically measured hearing impairment	-0.0146	0.00679	4.6048	0.0319
Functional hearing characteristics	-0.9781	0.3515	7.7450	0.0054
Functional hearing characteristics*Health	0.2389	0.1060	5.0771	0.0242

N=1,117.

Appendix table 4.3

Logistic regression of factors that influence employed men's working hours.

Average weekly working hours	Maximum likelihood estimate	Standard error	Wald Chi-Square	P-value
Constant	40.70978	1.74124	23.38	<.0001
Age 50-64	-0.10941	0.12939	-0.85	0.3980
Under or over the age of 60	-0.12035	1.09020	-0.11	0.9121
Marital status:				
Married/in partnership	1.18578	1.09467	1.08	0.2790
Divorced/separated	-0.73888	1.51174	-0.49	0.6251
Widower	-1.14595	3.09971	-0.37	0.7117
Unmarried	Reference			
Occupation:				
Self-employed/assisting	7.77965	1.15209	6.75	<.0001
Salaried employee/official	1.64564	1.03601	1.59	0.1126
Skilled	-0.69823	1.19464	-0.58	0.5591
Unskilled	Reference			
Education:				
Basic general education	-2.68070	1.30634	-2.05	0.0405
Upper secondary level	-2.28751	2.32883	-0.98	0.3263
Vocational	-1.90474	0.97008	-1.96	0.0499
Short-cycle higher education	-2.17144	1.48561	-1.46	0.1442
Medium-cycle higher education	-2.52319	1.11002	-2.27	0.0233
Long-cycle higher education	Reference			
Health:				
0-10 health problems	0.19233	0.24296	0.79	0.4288
Problems with skin diseases	-0.95631	0.82854	-1.15	0.2487
Hearing:				
Clinically measured hearing impairment	-0.02138	0.02212	-0.97	0.3340
Functional hearing characteristics	1.01082	1.23198	0.82	0.4122
Functional hearing characteristics*Health	-0.76092	0.48789	-1.56	0.1192

N=1,141.

Appendix table 4.4

Logistic regression of factors that influence employed women's working hours.

Average weekly working hours	Maximum likelihood estimate	Standard error	Wald Chi-Square	P-value
Constant	43.07015	2.35078	18.32	<.0001
Age 50-64	-0.24303	0.15745	-1.54	0.1232
Under or over the age of 60	0.28758	1.34299	0.21	0.8305
Marital status:				
Married/in partnership	-1.85419	1.47954	-1.25	0.2105
Divorced/separated	1.52433	1.71776	0.89	0.3752
Widower	-0.41796	2.20476	-0.19	0.8497
Unmarried	Reference			
Occupation:				
Self-employed/assisting	1.04268	1.68853	0.62	0.5371
Salaried employee/official	-1.42643	1.32857	-1.07	0.2833
Skilled	-2.33619	2.00522	-1.17	0.2444
Unskilled	Reference			
Education:				
Basic general education	-3.95449	1.73371	-2.28	0.0229
Upper secondary level	2.93727	3.07636	0.95	0.3400
Vocational	-4.08926	1.41109	-2.90	0.0039
Short-cycle higher education	-5.16835	1.57203	-3.29	0.0011
Medium-cycle higher education	-2.09542	1.45777	-1.44	0.1511
Long-cycle higher education	Reference			
Health:				
0-10 health problems	-0.41993	0.27882	-1.51	0.1325
Problems with skin diseases	0.57686	0.95371	0.60	0.5455
Hearing:				
Clinically measured hearing impairment	0.00436	0.03741	0.12	0.9072
Functional hearing characteristics	-4.93688	1.72123	-2.87	0.0043
Functional hearing characteristics*Health	0.51602	0.60245	0.86	0.3920

N=1,117.

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HARD OF HEARING?

HEARING PROBLEMS AND WORKING LIFE

This summary presents the results of a study of the impact of reduced hearing in relation to labour-market attachment and working life. Reduced hearing contributes to early retirement. Many people with impaired hearing are not aware of the impact of their hearing problems on their working life and social interaction in the workplace. When people develop hearing problems, the quality of their working life deteriorates in certain areas. It is the perceived deterioration of the quality of working life that causes people with impaired hearing to retire. There are clear differences between men and women, with regard to both the degree of hearing impairment and the consequences of the hearing problems. Hearing problems among the 50-64 years old Danes cause productivity losses of DKK 2.7 billion or approx. EUR 360 million on an annual basis.

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