QUALITY OF LIFE AMONG WOMEN WITH NOISE-INDUCED HEARING LOSS

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Abstract: One purpose of this study was to describe coping, disability and handicap, and psychological general wellbeing (quality of life) among women with noise-induced hearing loss. An additional purpose was to explore psychological and audiological factors affecting quality of life in this female group. Three standardised questionnaires were used: the Communication Strategies Scale (CSS), the Hearing Disabilities and Handicap Scale (HDHS) and the Psychological General Well-being Scale (PGWB). Data was consecutively assessed during one year at the hearing clinics on two hospitals in the western part of Sweden. Sixty-five females with hearing loss of sensori-neural type and a history of noise-exposure were included in the study. In a stepwise regression analysis, “interpersonal distress” and “speech perception” (subscales of the HDHS) and “verbal communication strategies” explained 45 percent of the variance (multiple R = 0.67). Interestingly, pure-tone audiometry and difficulties to hear sounds other than speech did not affect quality of life in this female group.

Introduction

The magnitude of the problem with noise-induced hearing loss (NIHL) in the world is not known. It has been estimated that in the USA about 30 million people are at risk for noise exposure in the workplace and for Europe the similar figure is given (Alberti, 1998). Continual exposure to high noise level damages the hair cells in the inner ear, leading to irreversible NIHL. In most cases, such a hearing loss could be prevented. Despite increased knowledge about noise as a threat to hearing, too many individuals still develop NIHL. Recent data from industries in Göteborg indicates that the incidence of NIHL is increasing after slightly decreasing figures during the eighties (Barrenäs, Hellström & Starck, 1998). In-depth interviews with men with NIHL (Hallberg & Barrenäs, 1995) showed that a collective illusion of invulnerability existed among noise-exposed workers. This illusion included the conception that the human ear is capable of differentiating between an acceptable and a hazardous sound pressure level. Relying on this conception, the workers’ ear protectors were hanging on the helmet and used when “it was really noisy” and the worker judged that he “needed them”. Two other misconceptions among the
men were, firstly, that "this type of work has to be that noisy", which means that noise is taken for granted and secondly, that "a real man endures noise". Similar results have been reported by Hétu and co-workers (e.g. Hétu, Riverin, Getty, Lalande & St Cyr, 1990; Hétu, Jones & Getty, 1993; Hétu, 1996).

It has been found that a minority of patients at the hearing clinics is self-motivated in seeking professional help (Mahoney & Stephens, 1996). In most cases, especially among the older patients, it was a family member who persuaded the patient to consult the hearing clinic. Loss of hearing often negatively affects the quality of life of the hearing impaired person and his/her close relatives. Definitions of quality of life have included subjective as well as objective indicators of physical and psychological phenomena (Oleson, 1990). One of these definitions, used in the present study, focuses on the individual’s intrapersonal affective or emotional states reflecting a sense of subjective wellbeing or distress (Dupuy, 1984). In-depth interviews with spouses of men with NIHL show that much of the burden of a NIHL rests on the spouse (Hallberg & Barrenäs, 1993; Hétu, Jones & Getty, 1993). The spouses in the study by Hallberg and Barrenäs used different management strategies to handle communication situations in everyday life, labelled co-acting, minimizing, mediating and distancing strategies. It has been reported that men with NIHL are reluctant to acknowledge, or even deny, hearing problems (Blaikie & Guthrie, 1984; Hétu et al., 1990; Hallberg & Barrenäs, 1993; 1995), and therefore they are not actively seeking professional help for their hearing loss. Health professionals in audiology who regularly conduct pure-tone audiometry tests on this noise-exposed group, might contribute to their denial of hearing problems. The patient’s total life situation, including the impact of hearing loss on family and social life, is seldom explored in the professional encounter with the audiologist. The medical-technical approach, which still exists in clinical audiology, might facilitate and reinforce the patient’s reluctance to identify and acknowledge hearing-related problems and also, the search for solutions of the problems (Hallberg, 1996).

Most research on NIHL and its consequences is based on data from men and, accordingly, research on women is sparsely reported (Westbrook, Hogan, Penney & Legge, 1992). Based on in-depth interviews with women with NIHL (Hallberg & Jansson, 1996), it was hypothesised that women are more likely to pass themselves off as normal hearing and therefore are less likely to be reported in studies of NIHL than men. As a consequence of this, females with this type of hearing loss become an “invisible“ group. It was obvious in the interviews that the women’s awareness of the risks of
noise as a threat to hearing was low. Women in Sweden often have part-time jobs and are less often than men actively engaged in the trade union (Nelander & Lindgren, 1994), which might contribute to an increased risk of exposure to unhealthy work conditions in general. The women in the study by Hallberg and Jansson (1996) alternated between blaming themselves and blaming others for their NIHL. They also alternated between controlling and avoiding coping strategies. The coping strategy chosen in a specific situation was aimed at preventing stigmatization and facilitated their passing through as normal hearing people.

Studies have shown differing correlations between pure-tone audiometry and self-reported handicap; weak, moderate and strong correlation has been reported (e.g. Lalande, Lambert & Riverin, 1988; Bess, Lichtenstein & Logan, 1990). Anderson, Dancer and Durand reported (1990) that male perceptions of hearing-related handicap are more predictive of pure-tone audiometry than female perceptions. The specific stressful event per see, personality disposition and cognitive appraisal are assumed to influence the coping process (e.g. Folkman & Lazarus, 1985). Some coping strategies seem to have a buffering effect between the stressful situation with listening and communication difficulties and the outcome (psychological wellbeing or quality of life). However, some coping strategies, e.g. pretending to hear and avoiding communication, at least in a long-term perspective, seem to increase feelings of handicap (e.g. Hallberg & Carlsson, 1991a).

Aim

The aim of this study was to describe self-reported disability and handicap (speech perception, non-speech sounds, interpersonal distress and threat to the self-image), coping strategies (verbal, non-verbal strategies and maladaptive behaviour) and psychological general well-being/quality of life (anxiety, depressed mood, positive well-being, self-control, general health and vitality) among women with hearing loss of sensori-neural type and with a history of noise-exposure. An additional aim was to predict psychological general well-being/quality of life from the degree and the duration of hearing loss, age, years of education, coping strategies and self-reported disability and handicap in this female group.

Method

Study sample

The study sample consists of 65 females in the age of 32-86 years (mean = 67.4 years; SD = 13.1). Eight women (4.6%) were 49 years or younger, 13 women (20%) were 80 years or older and about 75% of the women were between 50 and 79 years old. All women were consecutive patients the hearing clinic during one year. The sample seems to represent the population and the female patients at
the hearing clinics. The inclusion criteria were hearing loss of sensorineural type and a history of noise-exposure, Swedish speaking and not suffering from any severe disease.

In the study group, the pure-tone average over the low frequencies (0.5, 1 and 2 kHz) in the better ear was 30.1 dBHL (SD = 14.3) and for the high frequencies (3, 4 and 6 kHz) the mean value was 50.3 dBHL (SD = 16.9). The women reported that they had had subjective hearing problems in about 5 years (mean = 3.3; SD = 0.9). The response alternatives of this question were “less than 1 year” (1), “from 1 to 2 years” (2), “from 3 to 4 years” (3) and “more than 5 years” (4). Nineteen percent of the women (n = 11) reported that they had had subjective hearing problems for less than two years, whereas 55% (n = 54) of the women had had subjective hearing problems in more than 5 years.

On a four-point rating scale ranging from “very severe” (1) to “slight” (4), the study sample rated their hearing problems as “moderate” to “severe” (mean = 2.8; SD = 0.7). The women in the sample had an average 8.2 years of education with a standard deviation of 3.2 years. Twenty-nine women had hearing aids.

**Measurements**

Three standardised questionnaires were used: the Communication Strategies Scale (CSS), the Hearing Disabilities and Handicap Scale (HDHS) and the Psychological General Well-being Scale (PGWB). The two first questionnaires have been translated and psychometrically evaluated for Swedish circumstances. The third questionnaire was originally developed 1984 by Dupuy and was translated into Swedish by Wiklund and Dimenäs in 1989.

**The Communication Strategies Scale (CSS)** is a subscale of the Communication Profile for the Hearing Impaired (Demorest & Erdman, 1987). The Swedish version of the CSS has been used for the assessment of communication strategies in several studies (e.g. Hallberg, Eriksson-Mangold & Carlsson, 1992). The CSS consists of 25 items on a five-point rating scale ranging from “almost never” (1) to “almost always” (5), intended to assess three types of communication strategies: verbal strategies, non-verbal strategies and maladaptive behaviour. Scores on the subscale “maladaptive behaviour” are reversed before the statistical analysis. Reference data has been reported based on a sample of 199 hearing impaired patients at a Swedish hearing clinic (Hallberg et al., 1992).

**The Hearing Disability and Handicaps Scale (HDHS)** is an improved and shortened version of the Hearing Measurement Scale (Noble & Atherley, 1970). The original HDHS was developed by Hétu, Getty, Philibert, Desilets, Noble and Stephens (1994)
and consists of 25 items on a four-point scale, ranging from "never" (1) to "always" (4). The Swedish version of the HDHS is composed of four factorially derived factors, labelled speech perception (f1), non-speech sound (f2), interpersonal distress (f3) and threat to the self-image (f4). The sum of factors 1 and 2 intends to measure perceived disability, whereas the sum of factors 3 and 4 intends to capture perceived handicap. Corrected item-total correlation within each of the factors exceeded the significance level of 0.1%. The internal consistency reliability (coefficient alpha) for the four factors were 0.89, 0.85, 0.79 and 0.84, respectively. Reference data from 101 men with hearing loss of sensori-neural type and with a history of noise exposure has been reported (Hallberg, 1998).

The Psychological General Well-being Scale (PGWB) consists of 22 items on a six-point rating scale ranging from 0 (the most negative option) to 5 (the most positive option). The PGWB is composed of six dimensions: anxiety (five items), depressed mood (three items), positive well-being (four items), self-control (three items), general health (three items) and vitality (four items). The summed scores of these six dimensions form a PGWB-index, intended to capture the individual’s quality of life or, in psychological terms, the individual’s self-representations of intrapersonal affective or emotional states reflecting a sense of subjective well-being or distress. Reference data based on 1.209 residents of Dayton in Ohio, aged 14-75 years, has been reported (Ware, Johnston, Davies-Avery et al., 1979). The reliability of the PGWB, measured as coefficient alpha, was high (0.92).

Pure-tone audiometry and socio-economic data (e.g. age and years of education) was also assessed.

Procedure

The subjects were consecutive female patients with a hearing loss of sensori-neural type and a history of noise-exposure at the hearing clinics on two hospitals in the western part of Sweden. All women were informed about the aim of the study and, after informed consent, they were requested to fill in the three questionnaires and return the forms to the hearing clinic by post. Data was assessed during one year.

Statistical analyses

Descriptive analysis (mean and standard deviation) was conducted, using the SPSS. Comparisons of means of data from the study group and reference data were conducted using Student’s t-tests with pooled variances. Step-wise linear regression analysis was performed and correlations between variables included in the regression model were calculated as Pearson product moment correlation coefficients.
Results

Description of self-reported disability and handicap

Self-reported disability and handicap were assessed by the four factors of the HDHS: “speech perception” (f1), “non-speech sounds” (f2), “interpersonal distress” (f3) and “threat to the self-image” (f4). The sum of the first two factors (f1 and f2) intends to measure perceived disability. The sum of the two other factors, “interpersonal distress” (f3) and “threat to the self-image” (f4), intends to capture dimensions of perceived handicap. In the sample, the mean-values of “perceived disability” and “perceived handicap” were 25.5 (SD = 6.2) and 17.3 (SD = 5.6), respectively. The four factors showed the following mean-values and standard deviations: “speech perception” (f1); mean = 14.0; SD = 3.0, “non-speech sounds” (f2); mean = 11.5; SD = 3.8, “interpersonal distress” (f3); mean = 10.2; SD = 3.7 and “threat to the self-image” (f4); mean = 7.2; SD = 2.2. This indicates that the present female group “often” had difficulties to hear spoken speech and that they “sometimes” to “often” had difficulties to hear sounds other than speech, i.e. perceived disability. Interpersonal distress and threat to the self-image, i.e. dimensions of perceived handicap, were reported “sometimes” by the females. The median value of “speech perception”, “non-speech sound“, interpersonal distress“ and threat to the self-image“ (factors 1-4 of the HDHS) in the sample were the same as in data from 101 men with hearing loss of sensori-neural type and a history of noise-exposure. The median values for both the male group of men with NIHL (Hallberg, 1998) and the present female group were 14, 12, 9 and 7, respectively.

Description of coping strategies

“Verbal strategies“, “non-verbal strategies“ and “maladaptive behaviour“ were assessed by the CSS. The mean values of “verbal strategies“ and “non-verbal strategies“ were 3.2 and 3.4, respectively, with the same standard deviation (SD = 0.5), indicating that the women about “half of the time“ used these strategies in coping with listening and communication difficulties. “Mal-adaptive behaviour“, such as guessing, pretending to hear and avoid communication, were used “often“ by the females (mean = 2.9; SD = 0.4; reversed scoring). Compared to data from 105 men with NIHL, aged 40-60 years (Hallberg et al., 1992), the present female group used “non-verbal strategies“ significantly less often (t = -2.71; p<0.01) and “maladaptive behaviour“ significantly more often (t = 2.81; p<0.01) than the male group (table 1). The mean and standard deviation in the male group were for verbal strategies (mean = 3.0; SD = 0.8), non-verbal strategies (mean = 3.7; SD = 0.8) and maladaptive behaviours (mean = 3.3; SD = 0.6).
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Table 1. Means, standard deviations and p-values (t-test) for the subscales of the Communication Strategies Scale: verbal and nonverbal strategies and maladaptive behaviour in the present female group (n = 65) and in a group of men with NIHL (n = 105).

| Variable     | Females with NIHL n = 65 | Men with NIHL n = 105 |
|--------------|--------------------------|-----------------------|
|              | mean SD                  | Mean SD               |
| Verbal       | 3.2 0.5                  | 3.0 0.8               | N.S.      |
| Nonverbal    | 3.4 0.5                  | 3.7 0.8               | p<0.01    |
| Maladaptive  | 2.9* 0.4                 | 2.6* 0.6              | p<0.01    |

* = reversed score

Description of psychological general well-being (quality of life)

The PGWB intends to measure six dimensions of psychological general wellbeing (quality of life). The PGWB index has a maximum score of 110 (higher score indicates more positive options). The present female group (table 2) reported an average PGWB index of 78.43 (SD = 17.48). The difference in PGWB-index between a reference group of 1.209 American residents, aged 14-75 years (Ware et al., 1979), who had a mean-value of 82.18 (SD = 15.68), and the present female group did not reach the level of significance (t = 1.87; N.S.).

The present study group had a mean-value of 19.05 (SD = 4.52) on the "anxiety"-dimension of the PGWB. The items in this dimension assessed whether the woman was bothered by nervousness, was generally tense, anxious, worried or upset or if she felt that she was under stress, strain or pressure.

Table 2. Means, standard deviations and p-values (t-test) of six subscales and for the PGWB-index in the present study sample (n = 65) and in a reference group of 1.209 American residents.

| Variable        | Present sample (65 females with NIHL) | Ref. Data (n = 1.209 American residents) | p-value |
|-----------------|---------------------------------------|------------------------------------------|---------|
|                 | Mean SD                               | Mean SD                                  |         |
| Anxiety         | 19.05 4.52                            | 17.89 4.67                               | N.S.(t= 1.95) |
| Depressed mood  | 12.54 2.62                            | 12.36 2.54                               | N.S.    |
| Positive well-being | 11.36 3.35                     | 13.15 3.64                               | p<0.001 |
| Self-control    | 12.09 2.64                            | 13.00 2.26                               | p<0.01  |
| General health  | 10.77 3.18                            | 12.21 2.50                               | p<0.001 |
| Vitality        | 12.63 4.26                            | 13.57 3.51                               | p<0.05  |
| PGWB-index      | 78.43 17.48                           | 82.18 15.68                              | N.S (t =1.87) |

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“Depressed mood” (mean = 12.54; SD = 2.62) measured if the woman felt depressed, sad or downhearted and blue. The dimension of “positive well-being” (mean = 11.36; SD = 3.35) assessed the woman’s general spirits and if she was happy and satisfied with her personal life. The dimension of “self-control” (mean = 12.09; SD = 2.64) measured the perception of being in firm control or being afraid of losing the control. “General health“ (mean = 10.77; SD = 3.18) intended to measure if the woman was concerned or worried about her health. The “vitality“ dimension (mean = 12.63; SD = 4.26) indicated if the woman felt active, vigorous or if she felt tired and worn-out.

Compared to reference data (Ware et al., 1979), the present sample had significantly lower scores (more negative options) on four of the six dimensions of the PGWB; “positive well-being“ (t = -3.88; p<0.001), “self-control“ (t = 3.13; p<0.01), “general health“ (t = 4.46; p<0.001) and “vitality“ (t = 2.08; p<0.05). Low score on “wellbeing“ means that life is seldom felt as interesting and cheerful. Low score on “self-control“ indicates that the woman is very concerned or disturbed about losing her self-control. Low score on “general health“ indicates that the woman often is bothered of illness and/or bodily disorders. Finally, low score on “vitality“ indicates that the woman feel low in energy, tired and worn-out.

**Prediction of quality of life**

Together with a constant, 12 predictor variables (age, years of education, duration of hearing loss, pure-tone audiometry, verbal and non-verbal communication strategies, maladaptive behaviour, speech perception, non-speech sounds, interpersonal distress and threat to the self-image) were included in a step-wise linear regression analysis (alpha-to-enter = 0.5 and alpha-to-remove = 0.10). The index of the PGWB (the summed score of the six dimensions) was used as the dependent variable. Three predictor variables explained 45 percent of the variance in quality of life (multiple R = 0.67): “interpersonal distress“ and “speech perception“ (f3 and f1 of the HDHS) and “verbal strategies“.

**Table 3.** Predictive variables of quality of life including regression coefficients (non-standardised), p-values (two-tailed) and multiple R2 at three steps of a step-wise regression analysis; alpha-to-enter = 0.5 and alpha-to-remove = 0.10 (n = 65).

| Predictor variable       | Coefficient | p-value  | R2   |
|-------------------------|-------------|----------|------|
| 1. interpersonal distress | -2.29       | 0.0001   | 0.23 |
| 2. speech perception    | 3.49        | 0.0001   | 0.40 |
| 3. verbal strategies    | -7.88       | 0.0200   | 0.45 |
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In a first step (table 3), "interpersonal distress" was entered, explaining 23 percent of the variance (B = -2.3; t = -4.3; p = 0.0001). Low score on self-rated quality of life was related to high score on self-reported interpersonal distress in listening and communication situations. In a second step, "speech perception", was entered, which increased the explained variance to 40 percent (B = 3.5; t = 4.2; p = 0.0001). High score on speech perception was related to high score on quality of life. In a third step, "verbal strategies" was entered and the explained variance was raised to 45 percent (B = -7.9; t = -2.4; p = 0.0200). High score of verbal strategies was related to low score on quality of life. To sum up, high level of self-reported interpersonal distress and frequent use of verbal strategies were negatively related to quality of life whereas self-rated difficulties to hear spoken speech was positively related to quality of life in women with NIHL.

Pearson product moment correlations

For descriptive purposes, a correlation matrix is presented in table 4. The dependent variable, the PGWB-index, has been correlated with the four factors of the HDHS, the three factors of the CSS (verbal and non-verbal strategies and maladaptive behaviour) and the audiometric and socio-economic data (age and years of education). All variables were included in the multiple regression analysis.

Table 4. Pearson product moment correlations between variables included in the regression analysis model (n = 65). Significant correlations in bold.

| Var. | 1   | 2    | 3    | 4    | 5    | 6    | 7    | 8    | 9    | 10   | 11   | 12   |
|------|-----|------|------|------|------|------|------|------|------|------|------|------|
| 1    |     | .27  | -    | -    | -    | -    | -    | -    | -    | -    | -    | -    |
| 2    | .68 |     | -    | -    | .12  | -    | -    | -    | -    | -    | -    | -    |
| 3    | .12 | .09  |     | -    | -    | -    | -    | -    | -    | -    | -    | -    |
| 4    | .56 | .61  | .13  |     | -    | -    | -    | -    | -    | -    | -    | -    |
| 5    | .12 | .58  | .14  | .68  |     | -    | -    | -    | -    | -    | -    | -    |
| 6    | .12 | .04  | .12  | .02  | .09  | -    | -    | -    | -    | -    | -    | -    |
| 7    | .26 | .49  | .09  | .20  | .15  | .12  | -    | -    | -    | -    | -    | -    |
| 8    | .00 | .03  | .30  | .06  | .02  | .01  | .16  | -    | -    | -    | -    | -    |
| 9    | .21 | .12  | .57  | .16  | .19  | .32  | .17  | .29  | -    | -    | -    | -    |
| 10   | .07 | .09  | .44  | .16  | .28  | .38  | .14  | .00  | .66  | -    | -    | -    |
| 11   | .04 | .17  | .50  | .04  | .14  | .23  | .25  | .11  | .72  | .63  | -    | -    |
| 12   | .02 | .02  | .45  | .04  | .13  | .12  | .21  | .10  | .61  | .52  | .78  | -    |
| 13   | .20 | .26  | .14  | .25  | .20  | .24  | .14  | .08  | .06  | .21  | .48  | .28  |

variable 1: age r = 0.27; p<0.05
variable 2: years of education r = 0.31; p<0.01
variable 3: duration of hearing loss
variable 4: PTA low
variable 5: PTA high
variable 6: verbal strategies
variable 7: nonverbal strategies
variable 8: maladaptive behaviour
variable 9: speech perception (f1)
variable 10: non-speech sounds (f2)
variable 11: interpersonal distress (f3)
variable 12: threat to the self-image (f4)
variable 13: PGWB-index
The PGWB-index (quality of life) was significantly negatively correlated with two of the predictor variables: "interpersonal distress" (r = -0.48; p<0.001) and "threat to the self-image" (r = -0.29; p = 0.032). The correlation between the PGWB-index and "verbal strategies" was not significant (r = -0.24; p = 0.091).

Pure-tone average of the low (0.5, 1 and 2 kHz) and the high frequencies (3, 4 and 6 kHz) were not significantly correlated with quality of life (r = 0.25 and r = 0.20, respectively). The PGWB-index was neither significantly correlated with "speech perception" (r = -0.06) nor with "non-speech sounds" (r = -0.21).

Age was significantly negatively correlated with years of education (r = -0.68; p<0.001) and positively with pure-tone average over the low frequencies (r = 0.56; p<0.001). Years of education were significantly negatively correlated with pure-tone average over the low and high frequencies (r = -0.61 and r = -0.58; p<0.001, respectively) and with non-verbal strategies (r = -0.49; p<0.001). Duration of hearing loss was significantly negatively correlated with maladaptive behaviour (r = -0.30; p<0.05) and with the four factors of the HDHS (r = 0.57, 0.44, 0.50 and 0.45; p< 0.001, respectively).

Discussion

The inference that can be drawn from a multiple regression analysis is dependent on the model chosen for prediction. The predictor variables in the present model included psychological, audiological and socio-economic aspects, which were assumed to contribute to explaining the variance in quality of life in females with impaired hearing. In this study, quality of life was defined as the individual's affective or emotional states reflecting a sense of subjective wellbeing or distress (Dupuy et al., 1984). The result of the step-wise linear regression analysis showed that psychological factors (interpersonal distress and verbal communication strategies) as well as self-rated difficulties to hear spoken speech significantly affected the quality of life. Interestingly, self-reported difficulties to hear non-speech sounds and objectively assessed audiometric data (pure-tone audiometry) did not have significant impact on quality of life in this female group.

"Interpersonal distress", factor 3 of the HDHS, was the strongest predictor of quality of life. Factor 3, including six items, measures self-rated restrictions in social life (item 8), feelings of being tense and tired (item 12), people avoiding me (item 15), lack of self-confidence (item 16) feelings of being cut off (item 19) and impact of hearing loss on close relationships (item 20). High score on interpersonal distress is related to low score on quality of life. Social interaction is the very heart of human life (Jones, 1987) and is crucial for maintaining the self-
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image and the social roles. Noble (1983) described communication as a hearing act, composed of listening, monitoring and communicating. The hearing loss affects the whole hearing act. A message consists of a content component and a relational component, the latter reflecting whether the communicators confirm or disconfirm each other. In the social interplay the individual tends to perceive herself/himself as reflected in the view of others. In the hearing-impaired individual’s world, events are unpredictable and often have a happening-like character. Imposed limitations and restriction in social interactions due to a communication hindrance, such as impaired hearing, often result in stigmatization and feelings of handicap (Hallberg & Carlsson, 1991b). Such a reduction of status of the hearing impaired person might exclude her/him from being a full member of the human social world. In this study, the disturbed interaction with others was reflected in perceived “interpersonal distress”, which had a significant negative impact on quality of life.

“Speech perception” (factor 1 of the HDHS) assessed the self-rated ability to hear spoken speech and was the second significant predictor of quality of life. Items included in “speech perception” concerned ability to follow conversation (item 1), difficulties listening to the TV (item 5) and the radio (item 9), group conversation (item 13) and hear but not understand what was said (item 17). Interestingly, high score of speech perception was related to high score on the PGWB-index. The women seemed to be aware of their difficulties to hear spoken speech and this awareness increased their psychological general wellbeing (quality of life). This awareness might indicate that the women have an adequate and realistic view of the situation. Knowing that one actually has hearing problems in specific situations might lead to a readiness to manage the situation in an active and constructive way or by defining more and more topics as unimportant. Adaptation to progressive hearing loss has been described as a conflict between the need of sociability and the need of relief from tension in solitude (Orlans, 1987). According to Orlans, selective socialising is one stage in this process including a preference for smaller groups of close friends rather than larger social gatherings.

Neither pure-tone audiometry (PTA low and PTA high) nor self-rated difficulties to hear sounds other than speech (non-speech sounds) had any impact on quality of life in this female group. The importance of sounds other than speech in everyday listening situations has been reported by several authors (e.g. Noble, 1983; Lutman & Robinson, 1992; Kramer, Kapteyn, Festen & Tobi. 1995; Noble, Ter-Horst & Byrne, 1995). In a questionnaire-study by Kerr and Stephens (1997), subjects with acquired hearing loss were required to report positive aspects
of hearing impairment. Reduced disturbance by unwanted sounds was reported as a positive aspect by a third of the respondents. Successful communication strategies, such as choosing not to participate in conversation by “switching off”, was also reported as positive aspects of hearing loss. The authors stress that problems do persist even when positive aspects to their hearing loss are identified.

“Verbal strategies” was the third significant predictor of quality of life. A frequent use of verbal strategies was related to decreased psychological general wellbeing/quality of life. Verbal strategies include asking for repeat, informing others about the hearing loss and also asking other people to speak up. These active strategies mean that the hearing impaired person expects attention and consideration from the environment. The strategies might increase the involvement in everyday life at the expense of a decrease in psychological wellbeing/quality of life. Hétu, Lalande and Getty (1987) found that 90% of subjects with perceived severe hearing disability reported a need to ask for repetition “very often” in communication situations. Interviews with women with NIHL (Hallberg & Jansson, 1996) showed ambivalence between controlling (e.g. verbal strategies) and avoiding coping strategies. The woman’s perception of the “emotional atmosphere” in any specific communication situation decided how much attention and space she could take. In a friendly and positive atmosphere, verbal strategies were often used. In an unfriendly and negative atmosphere, invisible non-verbal strategies and maladaptive strategies were most often used. The driving force of coping is to “pass as normal” rather than being defined as a deviant person (e.g. Hallberg & Carlsson, 1991b; Hétu, 1996).

Anderson and co-workers (1990) found that pure-tone audiometry is more predictive in males than in females. However, a convincing relationship between pure-tone audiometry and disability and handicap is lacking in the literature. Despite standardised audiometric tests, pure-tone tests in a sound isolated chamber do not reflect an authentic listening situation. In addition to this, Johnson and Pichora-Fuller (1995) argued that the handicapping effects of a hearing loss would vary according to communication context. Kramer et al. (1996) suggest that pure-tone assessment is not sensitive enough to estimate the many facets of disability and handicap affecting the individual in everyday life. Therefore, the limitations of these tests as measures of daily life hearing increases the acceptance of self-reported hearing problems as an assessment tool of hearing disability.

In most cases, sensori-neural hearing loss caused by noise-exposure could be prevented. However, prevention of hearing loss requires
procedures that improve future health and could be included in a model of decision and perceived time. The individual is recommended to wear hearing protectors in noise (accept present day costs) for good hearing (future benefits). The final goal of good hearing ability (good health) might seem so distant that release from protectors (immediate satisfaction) is chosen. In addition to this, individuals often judge personal risks as smaller than the same risk for people in general. In prevention of NIHL, medical transactional models that passively transmit factual knowledge from the professionals to the general public have generally low success. In health promotion activities in audiology, the preventive medical model must be complemented by psychological health models, e.g. self-control and health belief models (Hallberg, 1996). Women working in noisy milieus seem to be less aware of the risks of noise to hearing than males (Hallberg & Jansson, 1996). Also, it might be a gender difference in coping with hearing loss: women with NIHL in this study used maladaptive behaviour significantly more often and nonverbal strategies less often than a group of men with NIHL. Additional research is needed to explore gender differences in awareness of the hazardous effects of noise and coping with NIHL.

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