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ORIGINAL RESEARCH

# Preventive Home Visit (PHV) Screening of Hearing and Vision Among Older Adults in Tórshavn, Faroe Islands: A Feasibility Study in a Small-Scale Community

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**Purpose:** Hearing and vision loss are common in later life but often overlooked and undertreated. The study aims to examine hearing and vision as part of preventive home visits (PHV) among 76-year-old home-dwelling citizens in Tórshavn, the capital of Faroe Islands.

**Patients and Methods:** In this cross-sectional study, three specially trained nurses conducted the examinations and tests, for this purpose, in the community health-centre.

**Results:** A total of 74 individuals participated (56% participation rate) of whom 77% had some degree of hearing impairment, 89% had visual impairment and 22% had dual sensory loss. A significant correlation between self-reported hearing ability and clinical findings was found, whereas self-reported vision did not correlate significantly with test-results.

**Conclusion:** Results indicate that implementing clinical assessments of hearing and vision as part of preventive home visits would benefit people receiving visits, and society by helping maintain the conditions that allow them to stay in their own homes for as long as possible.

**Keywords:** hearing, vision, Faroe Islands, preventive home visits

## Introduction

As populations are ageing, a higher proportion of people will experience some decline in functional capacity caused by health-related conditions. Health promotion and prevention are the foremost concepts used to describe approaches and interventions aimed at diminishing negative influence on daily living from health-related conditions.[1–3]

A general elder policy was formulated in 2013 in the Faroe Islands, followed by the passage of a bill.[4] The bill was based on two primary assumptions: remaining active postpones dependency in old age, and older people want to stay at home for as long as possible. Preventive home visits (PHV) targeting community-dwelling older persons are one way of achieving independence for old people and are now mandatory by law: all 76-year-olds shall be offered a voluntary PHV. PHVs are meant to promote health and well-being in later life, to identify risk factors concerning health, to prevent further decline of already ill health and to enhance the possibility of maintaining health-promoting activities, as well as to enable older people to be in better control of their everyday life.[3,5] Therefore, these visits have now become part of a proactive societal action in the

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Faroe Islands. The practice started in Tórshavn, the capital of the Faroe Islands, in 2001. It quickly attracted political attention and became mandatory by law in 2015. This means that PHV must be offered, but older adults are free to accept/decline the offer.

Hearing loss is a well-known condition among older men and women. One study[6] concluded that hearing loss is associated with significant adverse effects on the quality of life of elderly individuals and that these effects are perceived as severe handicaps, even by individuals with only mild to moderate degrees of hearing loss. Subsequent studies have confirmed these findings.[7,8]

Vision loss is also prevalent among older people. Guidelines from the World Health Organization (WHO) on community-level interventions to manage declines in intrinsic capacity,[9] based on a considerable review of cases, that there is a strong association between vision loss and undesirable outcomes such as depressive symptoms, lower life satisfaction, poor quality of life and reduced social interaction and functioning.

Studies on dual sensory loss (DSL), both hearing- and vision loss, has shown to be prevalent among older adults as well. A Canadian study, analyzing data from the Canadian Longitudinal Study on Aging showed that 25% of adults 70–75 years of age had DSL and the number is increasing.[10] According to Jaiswal et al, DSL has been found to be the strongest predictor of functional disability and might increase the likelihood of depression and reduced quality of life.[11]

Both hearing- and vision loss have been associated with chronic diseases and disability.[12–16] Several studies have shown an association between impairments in hearing and/or vision loss and cognitive impairment. This may manifest itself in relation to intellectual functioning, an increased likelihood of community service utilization, and lower scores on tests of memory and executive function, and decreased performance on cognitive tests.[17–21] A longitudinal study found that hearing and, in particular vision loss were associated with decline in cognitive performance.[22] Age-related sensory loss are thus an important public health concern.

Thus, there seem to be similarities between hearing and vision loss when considering their negative influence on factors associated with daily living. It is well known that hearing and vision deficits are common in older populations and that these impairments will increase with age.[23] However, from both a health promotional and a preventive perspective, hearing and vision loss are conditions that are often overlooked and undertreated in the elderly. A Norwegian study[24] examining hearing and vision among men and women >80 years of age confirmed a need for medical requirement of the hearing and vision functions for this age group.

In the Faroe Islands, PHVs were initially primarily based on unstructured conversations between the target audience and a nurse about daily living, possible challenges, and available resources. This practice was criticized for a lack of structure and ambition, and in particular for not implementing more clinical assessment tools.[25] In light of the Norwegian study and bearing in mind the importance of hearing and vision for elderly people, the Tórshavn study was initiated in collaboration with the preventive home visit (PHV) team in the Municipality of Tórshavn. Thus, the aim of this study was to investigate the prevalence of hearing and vision loss and DSL among home-dwelling men and women aged 76 living in the municipality of the Faroe Islands to estimate whether a structured clinical examination of hearing and vision with PHV could be an initiative to prevent negative consequences of overlooking sensory loss.

## Ethics

The present study followed the ethical principles outlined in the Helsinki declaration (World Medical Association, 2014). It was approved by the Faroese Data Protection Agency (dat.fo/loyvir 2017: 5.5. Værkætlan: "Hoyrn, sjón og ljósvidurskiftí í heiminum»). All participants provided informed consent.

## Design and Method

The Tórshavn study was designed as a cross-sectional, descriptive study. Data was collected during autumn/winter 2017/1018. The Preventive Team in the municipality which employs 3 nurses, invited all elderly adults who were born during the year 1941 and living in Tórshavn, to participate in the study. Inclusion criteria were 76-year-old and living in the municipality of Tórshavn. Exclusion criterion was presence of obvious cognitive impairment. The PHV-team contacted every person born in 1941 by phone and invited them to participate in the study.

Hearing and vision were screened at the communal health-center in the city. This was a deliberate choice to ensure standardized surroundings for all tests. A questionnaire for demographic information and a revised version of the KAS screen (Kartlegging av

Alvorlig Kombinerte sansetap blandt eldre) [Screening of serious, combined sensory loss among older people] for self-assessment of hearing and vision[26] was used. This questionnaire was chosen because it had been shown to be useful in previous studies where a combination of standardized tests and self-assessments of hearing and vision were used.[24,27] The questionnaire was filled out together with the nurse during the visit to the community health-centre.

A Mini Heine 3000 otoscope was used to inspect the eardrum and to check if the person had an excess of cerumen. A portable pure tone Screening Audiometer, AS608 Interacoustics (Air conduction) with Peltor H7A (CE en352-1:1993) headphones were used to measure the hearing function. Evaluation of the results was done according to WHO recommendation. The pure-tone average (PTA) which is an average of the frequencies 500, 1000, 2000 and 4000 Hz was used to measure formal hearing ability, and a Bailey-Lovie, LogMAR chart based on logarithmic progression, was used to check visual acuity (VA). The Bailey-Lovie, LogMAR chart was chosen because it provides the most valid results,[28,29] and it is easy to use. Often VA is designated as Snellen 6/6 (or 20/20 in the English measurement system), where the numerator denotes how far the person is from the chart in meters (or feet), and the denominator is the distance at which a person with normal VA would discern the same optotype (also 6 m in this case). In our study, we have used decimals to indicate VA instead of mathematical fractions (eg, 6/6 = 1,0 and 6/12 = 0,5). These instruments were chosen because they were feasible to use under the given circumstances and gave standardized measurements and self-evaluation of both hearing and vision. Of note, participants who assessed to have impairments received a referenced to a specialist for further evaluation.

The three nurses performing the tests had undergone a special training program, including about 16 hours of theoretical and practical instructions. The training of the three nurses consisted of theoretical and practical sessions as well as a thorough review of the instruments used for the screening.

## Statistics

Descriptive statistics were used to examine demographic data, hearing ability and visual function. For quantifying hearing function, PTA scores for the better ear of ≤25 dBHL, 26–40 dBHL, 41–60 dBHL and 61–80 dBHL were categorized as normal hearing or slight impairment, light, moderate and severe hearing loss, respectively. A hearing loss of more than 40 dBHL is considered a disabling hearing loss according to WHO reference values.[30,31] For quantifying visual function, VA decimalized values for the better eye of >0.8, 0.5–0.8, and ≤0.4 were characterized as normal, slightly visually impaired, and visually impaired, respectively.

One-way analysis of variance was used to examine the relationship between the results of standardized tests and the self-assessments. Bivariate correlations, $\chi$2-tested crosstabs, and Spearman's $\rho$ were used to determine whether impaired hearing and vision rendered it more difficult to communicate, read, and perform daily activities. DSL was defined as impairments in both hearing and vision. Odds ratio (OR) was calculated for DSL. Analyses were also stratified according to sex.

Statistical analyses were performed with the Statistical Package for Social Sciences for Windows (SPSS version 24.0; IMB, Armonk, NY, USA).

## Results

Of the 132 persons who received the invitation, 74 individuals, born in 1941, participated, 46 (62.2%) women and 28 (37.8%) men, corresponding to a participation rate of 56%. Seventy percent (n=52) were married or lived with a spouse, 22% (n=16) widow/er and 8% (n=6) lived alone. The highest level of education was high school for 30% (n=22) of the participants, college for 18% (n=13) and university for 31% (n=23); 22% reported other education, not specified. Table 1 shows the characteristics of the participants.

When the participants were asked to assess their own hearing, 47% (n=35) said their "hearing was good", "not so good hearing" was reported by 49% (n=36), while "poor hearing" was reported by 3% (n=2); one did not know. The correlation between self-reported hearing and measured hearing function (PTA results), shown in Figure 1, is significant (Spearman's $\rho$=0.58; $P$<0.001). However, four participants who reported no hearing problem had results above 40 dBHL, indicating moderate or severe impairment.

The prevalence rates of differing degrees of hearing loss in the present cohort categorized according to WHO reference values are given in Table 2. The mean PTA for the better ear was 34.6 dBHL (median =33.00 dBHL). Slight hearing loss was found in 46% and moderate hearing loss in 28% of the entire cohort (Table 3); no sex difference was observed ($\chi^2$=3.5, p=0.3). Of the 22%

**Table 1** Characteristics of the 74 Participants

| | % | N |
|---|---|---|
| Gender, F | 62.2 | 46 |
| **Marital status** | | |
| Married/cohabiting | 70.3 | 52 |
| Single | 8.1 | 6 |
| Widow/er | 21.6 | 16 |
| **Education** | | |
| Seventh grade | 16.2 | 12 |
| College | 13.5 | 10 |
| High School | 17.6 | 13 |
| University | 31.1 | 23 |
| Other | 21.6 | 16 |

**Table 2** Self-Assessed and Measured Hearing and Vision Function Among the 74 Study Participants

| | % | N |
|---|---|---|
| **Self-assessed hearing** | | |
| No impairment | 47.3 | 35 |
| Light/moderate impairment | 48.6 | 36 |
| Severe | 2.7 | 2 |
| I do not know | 1.4 | 1 |
| **Self-assessed visual function** | | |
| Normal vision | 64.9 | 48 |
| Slightly visually impaired | 29.7 | 22 |
| Visually impaired | 4.1 | 3 |
| Do not know | 1.4 | 1 |
| Glasses[a] | 93.2 | 69 |
| Hearing aid[b] | 21.6 | 16 |
| **Eye diseases**[c] | 30.4 | 21 |
| **Measured hearing and vision** | | |
| Disabling hearing[d] | 31.1 | 23 |
| Visually impaired[e] | 17.6 | 13 |

**Notes:** [a]using glasses on a regular basis or occasionally; [b]wearing hearing aid on a regular basis, occasionally or having one without using it; [c]glaucoma, cataract, age-related macular degeneration, retinal injury, other eye disease; [d]loss of more than 40 dB; [e]VA less than 0.4.

(n=16) of the participants who had hearing aids, 12% (n=9) used them daily, three only used them partly, while four had hearing aids but did not use them.

When the participants were asked to assess their own vision, 65% (n=48) said their vision was "good," 30% (n=22) said "not so good," 4% (n=13) said their vision was "poor" and one did not know (Table 2); women assessed their vision to be worse compared to men, albeit not significantly ($\chi^2$=5.2, p=0.07). Self-assessments of visual function were not correlated with the measured VA scores (Spearman's $\rho$=−0.14; P=0.3) (Figure 2). A total of 30% (n=21) stated they had been diagnosed with eye diseases (cataracts, age-related macular degeneration, glaucoma and other eye-related diseases). Analysis of the relationship between participants' self-assessment of vision and measured VA showed that six who reported that their "vision was good" actually had visual impairments (≤0.4).

The VA distribution of the best eye of the participants was identified and is shown in Table 4. Mean VA was 0.64 (median=0.63), which, according to the WHO

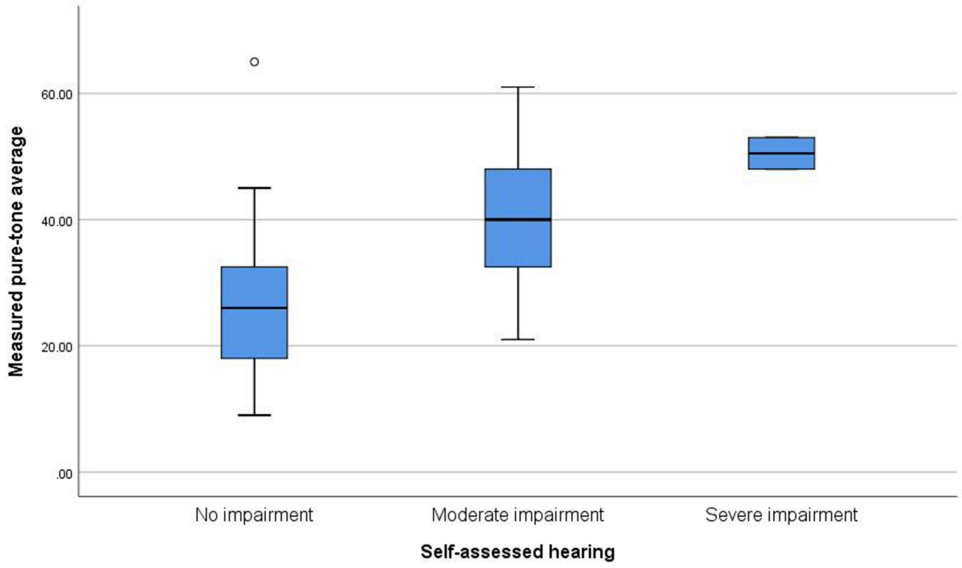


**Figure 1** Correlation between measured pure-tone average and the self-assessment of the hearing function (Spearman's $\rho$=0.58; P<0.001).

**Table 3** Distribution of the Measured Pure-Tone Average of the 74 Study Participants

| Degree of Hearing Loss According to WHO Reference Values | | % | N |
|---|---|---|---|
| No impairment or very slight hearing problems | ≤25 dBHL | 23.0 | 17 |
| Light impairment (hearing aid may be needed) | 26–40 dBHL | 45.9 | 34 |
| Moderate impairment (hearing aid usually recommended) | 41–60 dBHL | 28.4 | 21 |
| Severe impairment (hearing aids needed/lip reading) | 61–80 dBHL | 2.7 | 2 |

classification, indicates slight visual impairment (Table 4); no sex-difference was observed (p=0.3). Among the participants, 74% (n=55) used spectacles daily, whereas 19% (n=14) used them occasionally (Table 1). Independent-sample *t*-tests revealed no sex difference in visual or hearing function among women and men.

**Table 4** Distribution of Measured Visual Acuity

| Visual Function According to WHO Reference Values | | % | N |
|---|---|---|---|
| Normal vision | >0.8 | 10.8 | 8 |
| Slightly visually impaired | 0.5–0.8 | 71.6 | 53 |
| Visually impaired | ≤0.4 | 17.6 | 13 |

## Dual Sensory Loss (DSL)

DSL was observed in 22% of the entire cohort (n=16). The odds for having DSL were 0.25 for men and 0.20 for women. $OR_{male/female}$ for having DSL was 1.37 (p=0.6). Thus, although there is no evidence that it is more common for men than for women to have DSL, one-fourth of the men (25%) while only 20% of the women in this study had DSL (p=0.5).

## Ability to Communicate and Read

Communication, access to information, and reading are considered important features of everyone, including older adults. The results of the screen interviews concerning verbal communication and access to information, where reading is included, are presented in Table 4.

In terms of hearing and verbal communication, 12% (n=9) needed to look at the face of the person they were talking with, 4% (n=3) found it difficult to understand dialects, and 57% (n=42) found it always or occasionally difficult to understand when people talked too rapidly, too quietly, or unclearly. When many people were present, 60% (n=44) found it difficult to understand speech. All participants could read newsprint headlines while 92% (n=68) could read regular-size newsprint. However, 53% (n=39) could not read very small print, and 20% (n=15) of the participants found it tiring to read.

When the participants were asked if their vision had changed the last 2–3 years, 46% (n=34) reported worsening of the vision, while 50% (n=37) reported unchanged vision (Table 5). When asked about their last hearing or

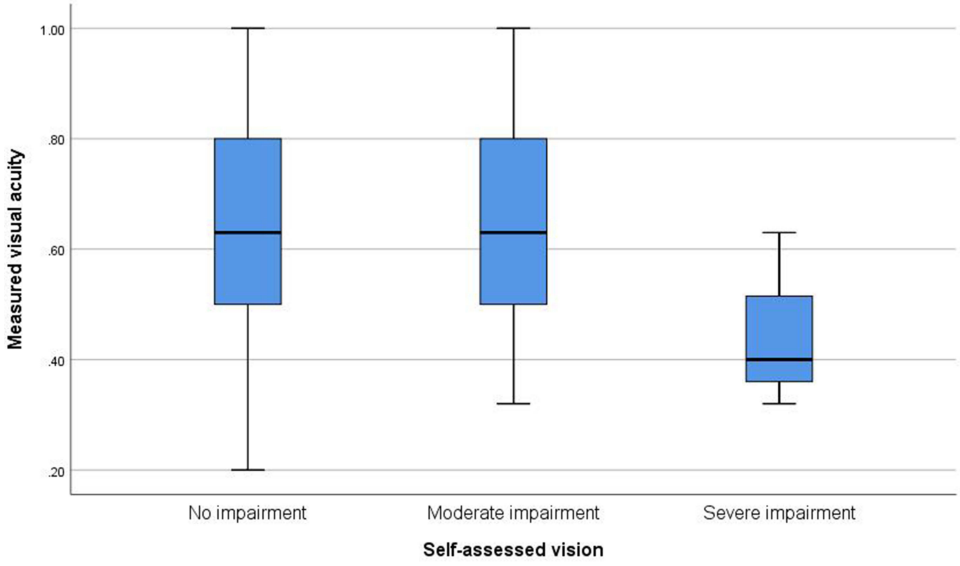


**Figure 2** Correlation between measured visual acuity and the self-assessment of the visual function (Spearman's $\rho$=−0.14; P=0.3).

**Table 5** Self-Assessed Ability to Communicate and Read from the Screening (n=74), % (n)

| | No | Yes | Occasionally | Do Not Know |
|---|---|---|---|---|
| Difficult to recognize people because of vision | 83.8 (62) | 14.9 (11) | 0 | 1.4 (1) |
| Can read newspaper headlines | 0 | 100 (74) | 0 | |
| Can read regular newspaper print | 8.1 (6) | 91.9 (68)** | 0 | |
| Can read very small print | 52.7 (39) | 39.2 (29) | 0 | 8.1 (6) |
| It is tiring to read | 79.7 (59) | 20.3 (15) | 0 | |
| People talk too fast, too quietly, or unclearly | 39.2 (29) | 20.3 (15)* | 36.5 (27) | 4.1 (3) |
| Hearing inhibits conversation | 68.9 (51) | 4.1 (3)*/** | 25.7 (19) | 1.4 (1) |
| Difficult to understand when many are present | 40.5 (30) | 33.8 (25)* | 25.7 (19) | |
| Difficult to speak on the phone | 82.4 (61) | 6.8 (5)* | 10.8 (8) | |
| Difficult to understand dialects | 87.8 (65) | 4.1 (3)* | 8.1 (6) | |
| Difficult to speak with strangers | 79.7 (59) | 2.7 (2)* | 14.9 (11) | 2.7 (2) |
| Need to look at the face | 79.7 (59) | 12.2 (9) | 6.8 (5) | 1.4 (1) |
| Can see and hear text and pictures on television | 6.8 (5) | 91.9 (68) | 1.4 (1) | |
| Can hear radio | 2.7 (2) | 93.2 (69)* | 4.1 (3) | |

**Notes:** *Significant correlations with PTAV for the better ear, with coefficients ranging from 0.232 to 0.438. **significant correlation with VA for the better eye, coefficient –0.433 and 0.238, respectively.

vision check, 22% reported they had their hearing checked, and 77% had their vision checked, within the last 2 years. Forty-nine percent reported they never had their hearing checked while only 1% had never checked their vision.

The correlations between PTA for the better ear and the questions concerning hearing and verbal communication were significant for some questions but not others as indicated in Table 5. The correlations between VA for the better eye and the more detailed questions related to vision and reading was only significant for "able to read regular-size newsprint".

## Discussion

In the Tórshavn study examining hearing and vision clinically among 76-year-old home-dwelling citizens living in the capital of the Faroe Islands, 77% of the participants had some degree of hearing loss, and 89% had some sort of visual impairment, while DSL was observed in 22% of the entire cohort. This include both mild, moderate and severe impairments.

To our knowledge, this is the first study where all participants were of the same age (76 years). Another study performed in Australia assessing hearing and vision loss showed that the prevalence of hearing, vision and DSL for 70–79-year-olds was 51.2%, 9.4% and 5.5% respectively.[32] Compared with the Australian study,[32] the results of the Tórshavn study show a higher degree of loss in hearing, vision and DSL. Only 23% had normal hearing compared to 51% in the Australian study.[32,33] Visual loss was 18% in the present study or twice as high as in the Australian study.[32] A study performed in England estimated hearing loss to affect one in five (19%) adults aged 51 to 80 years in England and Wales. Among older adults aged 60 and above, 11% have a vision loss and DSL affected at least 3% of the older population.[34] The number of older people aged 60 years and above living alone in Britain, a country that can be compared to the Faroe Islands when it comes to living conditions, is likely to increase from 14 million in 2011 to nearly 21 million by 2032, making age-related sensory loss an increasingly important public health issue.[13]

DSL was considerably higher in the Tórshavn study (22%), and a sex difference was also observed, with one-third of men having DSL compared to one-fifth of women. Though the same sex difference was found in another study,[23] the independent sample t-tests in this study revealed no gender difference in visual or hearing function among women and men. Bearing in mind the somewhat small sample size in the Tórshavn study, more research is needed to determine whether there is evidence to say that it is more common for men than for women to have DSL. Studies on DSL have shown to be prevalent among older adults. A Canadian study, analyzing data from the Canadian Longitudinal Study on Aging showed that 25% of the adults 70–75 years of age had DSL and the number is increasing,[10] something that, as already mentioned, can

cause both depression and reduced quality of life in addition to functional disability.[11]

Further, less than half of the participants in the Tórshavn study had had their hearing examined previously, and only 14% of the participants had checked their hearing within the last year. This indicates and highlights the need for changing the PHVs to also include structured and clinical assessments of hearing and vision. Making such changes possible, however, would require political attention and willingness to grant the necessary funding.

The participants in this study were all 76 years old and living in their own homes without receiving any home-care provisions. A previous study[35] showed that participants with an average age of 90 years old and receiving home-care services could not be expected to address their functional sensory loss themselves. These findings, and the fact that these age-related sensory loss are important health issues to consider, highlight the need for preventive intervention in the Faroes and support the implementation of a routine assessment.

It is important, however, to notice that the prevalence of hearing and vision loss and of DSL differs according to the measurements and definitions used, as well as the cut-off points and age distribution, making comparisons among such studies somewhat challenging.[36–38] The number of individuals with such impairments will increase with the expected increase in the 65 and older age group.[39]

Usually, the prevalence of hearing and vision loss is lower in studies based on self-reporting compared to studies with standardized tests.[40,41] In the Norwegian study, where people >80 years were screened, there was no correlation between self-assessed hearing based on one global question and the measured PTA. In fact, a receiver operating characteristic (ROC) curve analysis revealed that there was a discrepancy between self-assessments and standardized tests of the hearing function. Therefore, self-assessment of the hearing function in that cohort with mean age of 90 years was not a valid tool for determining whether hearing loss was present.[24] For the 76-year-olds in the Tórshavn study, however, there is a better correlation between the self-assessed and the measured hearing function based on one global question. This may indicate that self-assessment of hearing function among 76-year-olds is more reliable among the 76-year-olds than among those >80 years old, according to a Norwegian study that showed a larger discrepancy between standardized tests and self-assessments.[24] However, the Tórshavn study also reveal that if or when using self-assessment of assessing the hearing function, more detailed questions about hearing would be more valid than just asking one global question such as ”Do you rate your hearing as good, not so good or bad?” In addition, it is also noted that four participants (5%) who reported no hearing problem when asked the global question had in fact results above 40 dBHL from the audiometer test, indicating moderate to severe impairment. Therefore, the safest results would be to assess the hearing with both an audiometer and self-assessment.

Conversely, did we not find a correlation between self-assessed visual function and measured VA, which is in line with the results from the Norwegian study.[42] This means that only asking the 76-year-olds to rate their vision as good, not so good, or bad is not a valid tool to determine whether they have a visual impairment. Analysis of the relationship between participants’ self-assessment of vision and measured VA showed than six (8%) who reported their vision was good, actually had visual impairments (<4). This means that assessing the vision is best done using both self-assessing and standardized methods.

The Tórshavn study was an experiment where three PHV nurses in Tórshavn offered to measure the hearing and vision of the 76-year-olds in the municipality. The results show that 23% had normal hearing and 14% had normal vision. Those who had an impairment or some other abnormality were offered a reference to a specialist to be examined. The referral could be to the hospital that has both a hearing- and an eye clinic, to a private hearing clinic in the city or to one of the several opticians.

Often it can be challenging to measure the effects of health-promoted and disease-preventive initiatives because of their multifaceted, complex, and long-term nature. In this case, however, the incidence and the degree of impairment may be considered relatively high for this age group, and impairments should be expected to develop further and become even more severe if they are not handled by specialists.

The tests and measurements performed by the three PHV nurses could ideally be carried out within one hour and in the home of the older adults during the routine visit. In a small-scale community like Tórshavn, with a limited number of older people of each generation, this study shows that it is possible for the three PHV-nurses to perform the tests during regular working hours.

Apart from the obvious benefit for the participant, who gets the possibility to either improve or compensate their

loss of hearing and/or visual function, the intervention also carries possible benefits for the community by supporting older adults' independence and coping ability, and making it possible for them to stay longer in their own homes. However, screening does not automatically ensure change in behavior or making the individuals act on the assessment outcomes. Research is needed on follow-up rates of recommended actions taken to improve hearing and vision. Findings in this study also show an unmet need in terms of preventing physical and mental consequences of poor eyesight and hearing as described in the previous literature; hence, further research on the subject is needed.

The study has several strengths, notably the use of standardized and validated procedures throughout our investigation and special training for the three PHV nurses. However, the study also has some limitations. The sample size is relatively small, and the participation rate was only 55%, which may introduce bias and limit generalizability. This makes it necessary to maintain a certain reservation regarding our results since we do not know who "the not-attendants" were and what their health condition was. Furthermore, the study was conducted in the capital of the Faroe Islands, which has a large proportion of people with higher education and thus might not be representative of the whole country.

## Conclusion

A total of 77% of the participants had some degree of hearing loss, 89% had some sort of visual impairment, while DSL was observed in 22%. These results suggest more attention should be paid to hearing, vision, and DSL among older adults (in this study 76-year-olds). This study indicates that implementing hearing and vision tests, in the homes or in a community Health house, as a standard offer as part of mandatory preventive home visits by nurses would benefit both the individuals and the community at large.

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## Author Contributions

All authors made a significant contribution to the work reported whether that is in the conception, study design, execution, acquisition of data, analysis and interpretation, or in all these areas; took part in drafting, revising or critically reviewing the article; gave final approval of the version to be published; have agreed on the journal to which the article has been submitted; and agree to be accountable for all aspects of the work.

## Disclosure

The authors report no conflicts of interest in this work.

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