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Work absence and ability in tinnitus patients: the role of hyperacusis and tinnitus severity

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ABSTRACT

Objective: Identify factors predicting work capacity among patients with tinnitus and hyperacusis.

Design and study sample: This study employed a cross-sectional design, collecting data from four Norwegian audiology clinics (N = 80) and two Norwegian rehabilitation centres (N = 47). The patients in this study were invited to complete a web-based questionnaire.

Results: This study found significant positive correlations between levels of tinnitus, hyperacusis, and mental distress (*r*s in the range .51 − .74). Logistic regression models showed that reduced work capacity was predicted by both tinnitus (OR = 1.07) and hyperacusis (OR = 1.13), and that hyperacusis predicted work absence (OR = 1.08).

Conclusion: The findings demonstrate a moderate association between tinnitus and hyperacusis ($r = .51$), with both conditions affecting the work capacity of more than 50% of participants in the study. Moreover, the results indicate that the severity of tinnitus and hyperacusis is directly related to impaired work capacity and higher rates of work absence.

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Tinnitus; hyperacusis; work capacity; work absence; anxiety; depression

Introduction

Tinnitus and hyperacusis are two commonly occurring auditory conditions that exhibit a strong correlation in terms of severity (Cederroth et al. 2020, p. 7). Tinnitus, a phantom auditory sensation, has recently been defined with a psychological dimension and being a disorder: "when associated with emotional distress, cognitive dysfunction, and/or autonomic arousal, leading to behavioural changes and functional disability" (De Ridder et al. 2021).

On the other hand, hyperacusis refers to a condition in which individuals have an abnormally low tolerance to normal sounds in their environment, leading to discomfort and reduced engagement in work, social activities, and daily routines (Cederroth et al. 2020, p. 2). Despite their significant impact on quality of life, the relationship between tinnitus, hyperacusis, and work capacity remains underexplored in research. To date, no studies have been conducted in Norway to investigate this relationship.

The HUNT study conducted in Trøndelag, Norway, aimed to investigate the prevalence of tinnitus in a representative sample of the local population (Jørgensen et al. 2022). The study utilised baseline data from the HUNT Hearing study, a comprehensive population-based study conducted between 1996 and 1998, and with a sample of 21,754 adults. The findings from the HUNT study revealed that a proportion of participants, approximately 9.9% or 2154 individuals, reported experiencing varying degrees of tinnitus (Jørgensen et al. 2022). These results shed light on the prevalence of tinnitus within the Norwegian population. However, the prevalence of hyperacusis among the Norwegian population remains unknown.

While work is often associated with improved well-being and mental health, it can also be a source of significant stress and fatigue, for instance for individuals with tinnitus, who may experience greater work-related fatigue and a higher need for recovery due to difficulties in concentration and overall work performance (Watts et al. 2018; Simons et al. 2023). The detrimental effects of tinnitus can result in significant implications for an individual's work capacity, as indicated by Baguley et al. (2018, p. 98). A nationwide registers-based study conducted by Friberg, Rosenhall, and Alexanderson (2013) in Sweden reported prolonged sick leave resulting from tinnitus, with some cases lasting up to a year. Similarly, the data from Bhatt, Bhattacharyya, and Lin (2017, p. 468) revealed a substantial association between tinnitus symptoms and missed workdays in the USA. Individuals with tinnitus were found to miss approximately 1.8 times more work compared to those without tinnitus. Bhatt, Bhattacharyya, and Lin (2017) emphasise that considering the psychosocial and sleep disturbance problems associated with tinnitus, it is understandable that these patients experience repercussions in various aspects of their lives, including their work and job performance. Bhatt's study utilises a comprehensive national database, including all 50 states and the District of Columbia, ensuring broad representation, and enhancing generalisability.

A study by Paulin et al. (2019) in Finland showed that hyperacusis is a chronic condition that can persist for several years, causing substantial challenges for patients in their work and social lives. Tyler et al. (2014, p. 402) also found that hyperacusis can be challenging for patients, necessitating significant adjustments to their work and social habits. The studies cited above

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highlight the extensive impact of tinnitus and hyperacusis on individuals' work capacity and social participation, underscoring the necessity for additional research.

Research has established a connection between tinnitus, hyperacusis, and anxiety and depression, with the latter two conditions commonly co-occurring (Baguley et al. 2018; Cederroth et al. 2020; Fackrell et al. 2022; Aazh and Moore 2017). It is imperative to investigate whether the co-occurrence of anxiety and depression can adversely impact the work capacity of individuals with tinnitus, both with and without hyperacusis, within the Norwegian population. This consideration might be crucial, given the substantial implications it could hold for occupational productivity. Furthermore, cognitive function, including attention and concentration, is an important consideration that could affect the work performance of individuals with tinnitus and hyperacusis (Fackrell et al. 2022; Aazh and Moore 2017).

In addition to these psychological and cognitive challenges, stress could potentially impact work performance in individuals with tinnitus and hyperacusis. Work-related stress is a prominent subject of concern, as it has been linked to diminished job satisfaction, reduced organisational commitment, and an inclination to leave one's profession prematurely (Peter et al. 2022). These consequences can further exacerbate existing workforce shortages.

Hearing loss has been linked to negative employment outcomes, including higher rates of unemployment, underemployment, and increased work-related stress (Shan et al. 2020). Furthermore, Shan et al. highlight that individuals with hearing loss frequently report elevated stress levels, reduced job control, and significant communication difficulties in the workplace. These challenges are also relevant for individuals with tinnitus and hyperacusis, as both conditions can similarly increase stress, and reduced engagement in work (Peter et al. 2022; Cederroth et al. 2020).

Previous studies have predominantly focused on the clinical aspects of tinnitus and hyperacusis, such as diagnosis and treatment (e.g. Baguley, McFerran, and Hall 2013; Schecklmann et al. 2014; Aazh and Moore 2017). However, research has largely overlooked how these conditions may affect work capacity and occupational life.

This study therefore examines the work-related consequences of tinnitus and hyperacusis, including job absence and risk for reduced work capacity in a Norwegian clinical population. Furthermore, the study seeks to promote a greater understanding of the psychological challenges that individuals with these conditions face in the workplace.

Materials and methods

Ethical approval

The study adhered to ethical guidelines and was approved by Service Provider for the Knowledge Sector (SIKT), and ethical guidelines were approved by the Regional Committees for Medical and Health Research (REK) (Reference Number 178677). Patients were presented with an information letter and a consent form outlining the study's purpose, and how the collected data would be used. The study was based on voluntary participation, and participation could withdraw from the study at any time.

Study design and participants

This study used data from the cross-sectional study "Investigation of the Norwegian Clinical Population with Tinnitus and Hyperacusis," led by Guri Engernes Nielsen at the Department of Special Needs Education, University of Oslo, Norway. Two different samples obtained in two recruitment phases, which in the initial phase enrolled patients from audiology clinics and in the second phase patients from rehabilitation centres. A total of 127 participants were included in this study, who satisfied the inclusion criteria of being 18 years or older and presenting with tinnitus and suspected hyperacusis.

The initial data collection for this investigation was sourced from outpatients from four reputable audiology clinics in Norway, namely St. Olav's Hospital in Mid-Norway, which is also located on the border of the Northwestern region, Akershus University Hospital in Eastern Norway, Molde Hospital in Mid-Norway (all public clinics), and HØR clinic in Eastern Norway (a private clinic). Between May 5th, 2021, and March 31st, 2022, multiple audiologists at each clinic played an instrumental role in recruiting eligible patients for the study. The outpatients were invited to participate during their first appointment, after their initial audiological assessments. Those who expressed interest in participating were provided with a weblink and instructed to log into a web-based form to confirm their participation by giving informed consent. The link to the survey was then sent to their email address, where they were able to complete the survey, approximately within 30 minutes, containing three tinnitus questionnaires, one hyperacusis questionnaire, two mental health questionnaires and three questions regarding occupation, work ability, and work absence. The study's final sample comprised 80 eligible outpatients aged 19 to 73, with a mean age of 51.5 (SD 13.80).

In the study's second phase, additional tinnitus and hyperacusis inpatients were recruited from two rehabilitation centres in Norway: Unicare Landaasen in Eastern Norway and Nordtun HelseRehab in Northern Norway. The reason for including a second round of recruitment and with patients from rehabilitation centres was to make sure we included the full breadth of the tinnitus population in Norway. The two rehabilitation centres were selected based on their reputation for treating tinnitus and hyperacusis patients and their enthusiastic willingness to participate in the study. There are a few rehabilitation centres in Norway that admit patients with tinnitus as their primary diagnosis. The patients stay for two weeks at a time, during which they receive lectures in groups as well as individual consultations about tinnitus and hyperacusis, treatment methods and strategies. The inpatient recruitment from the rehabilitation centres occurred one year after recruitment from the audiology clinics, specifically from January 5th to March 2nd, 2023. The sample consisted of tinnitus and hyperacusis inpatients on a 14-day rehabilitation stay at the centres who met specific eligibility criteria, such as being 18 years or older and having a diagnosis of tinnitus with or without hyperacusis. In total, 47 inpatients completed the survey.

Eligible inpatients were informed of the study's objectives by a researcher at Unicare Landaasen and a psychologist at Nordtun HelseRehab, respectively. The web-based questionnaires for outpatients in the audiology clinics were also administered to inpatients in the rehabilitation centres. Inpatients were given the same web-based questionnaire using a QR code. The 47 inpatients who completed the survey during their rehabilitation stay ranged from 25 to 72 years, with a mean age of 53.8 (SD 8.75).

Thus, the final sample consisted of 127 patients from a diverse pool of outpatients from audiology clinics and inpatients from rehabilitation centres. Of these participants 18 participants were not employed during the time the questionnaires were answered. Moreover, of these 18 participants, 12 were retired. This recruitment approach resulted in significant geographic variation among individuals suffering from tinnitus and hyperacusis.

Measures

Tinnitus sample case history questionnaire

The current investigation used self-reported questionnaires as the primary modality for data collection, with the Tinnitus Sample Case History Questionnaire (TSCHQ) constituting one of the principal tools employed. The Norwegian adaptation of the TSCHQ used in this study was pre-validated and translated by Sørensen, Nielsen, and Larsen (2020), who adapted it from the original version developed by Langguth et al. (2007). The TSCHQ comprises 35 items, encompassing both closed-ended and open-ended items, that necessitate written responses or percentage values.

One specific item of the TSCHQ evaluated the association between stress and tinnitus, where the response options were whether stress "exacerbates tinnitus", "reduces tinnitus" and "has no effect". The response options "reduces tinnitus" and "has no effect" were combined and adjusted into a single response option designated as "not significant" to correspond with the statistical analyses implemented in this study. The final six items of the TSCHQ assessed physical and psychological complaints such as headaches, vertigo or dizziness, jaw disturbances, neck pain, pain syndromes, and psychiatric conditions. These items were combined into a single variable, "additional physical and psychological complaints," with participants receiving a score of 1 if they reported one or more complaints and 0 if they reported none.

Tinnitus handicap inventory

The Tinnitus Handicap Inventory (THI) is a comprehensive and psychometrically sound questionnaire developed to assess how tinnitus impacts an individual's quality of life. Initially created by Newman, Jacobson, and Spitzer (1996), the THI has been evaluated in the "Investigation of the Norwegian Clinical Population with Tinnitus and Hyperacusis." In this inquiry, the THI has been translated from its original English iteration into Norwegian for use with the Norwegian population. Hall et al. procedure for back and forward translation were followed (Hall et al. 2018).

The THI consists of 25 items, utilising a nuanced rating scale that incorporates responses such as "none" (scoring 0 points), "intermittent" (scoring 2 points), and "constant" (scoring 4 points). The cumulative score on the THI ranges from 0 to 100, with higher scores on the THI denoting more severe tinnitus handicap. According to Newman, Jacobson, and Spitzer (1996), scores in the range of 0–16 indicate no tinnitus handicap, 18–36 points imply mild tinnitus handicap, 38–56 points signify moderate tinnitus handicap, and scores ranging from 58–100 points suggest a severe tinnitus handicap. The translated THI shows good internal consistency (Cronbach's alpha = .96, McDonald's Omega = .96) and test-retest reliability (ICCA,1 = .92), as well as convergence with the Tinnitus Functional Inventory (Pearson's r = .82) (Engernes Nielsen & Falck, in preparation).

Hyperacusis questionnaire

The Hyperacusis Questionnaire (HQ) employed in this inquiry constitutes a validated Norwegian translation by Larsen et al. (2021) of the questionnaire devised by Khalfa et al. (2002) in a normal population. The HQ is comprised of 14 items, each of which presents response options such as "no" (scored 0 points), "yes sometimes" (scored 1 point), "yes quite often" (scored 2 points), and "yes often" (scored 3 points). The aggregate score on the HQ ranges from 0 to 42 points. The diagnostic criteria for assessing hyperacusis handicap have engendered extensive scholarly debate (Khalfa et al. 2002; Aazh and Moore 2017). This study employed a cut-off score of 22 or above on the HQ to establish the diagnosis of hyperacusis handicap. This decision aligns with the proposed cut-off score based on a clinical population (Aazh and Moore 2017).

The hospital anxiety and depression scale

The Hospital Anxiety and Depression Scale (HADS) is a widely used self-report questionnaire designed to measure symptoms of anxiety and depression in clinical research (Zigmond and Snaith 1983) and is a validated questionnaire in Norway (Larsen et al. 2021). It consists of 14 items, seven related to anxiety and seven related to depression. Each subscale is scored on a scale of 0–21 points; the total score ranges from 0–42 points.

In this study, the term "mental distress" will be utilised specifically to encompass anxiety and depression. While "mental distress" typically encompasses a broader spectrum of mental health concerns, its application within this study will be limited to serve as a comprehensive concept that focuses on anxiety and depression. This choice of terminology has been made to facilitate a cohesive discussion and analysis of these two conditions within the study.

Additional questions about work and work capacity

The web-based questionnaire added three questions to investigate the patient's current employment situation. One question gathered information on the current employment status of participants, which was labelled as "Job" (J) for this current study. Job (J) has an open-answer category, meaning that participants can freely enter their job title without being restricted to predetermined response options. An open-answer category allows for a more comprehensive and accurate representation of the participant's job title, allowing for a broader range of job titles to be included in the study.

Assessing work capacity holds a central place in the present investigation. A question was added to measure the perceived impact of tinnitus and hyperacusis on a patient's job performance, labelled Work Ability (WA). The respondents are required to provide a quantitative assessment of the extent to which tinnitus and hyperacusis affect their work capacity by selecting one of four response options: "No, no significance," "Yes, somewhat clear significance," "Yes, clear significance," and "Yes, it is the reason why I had to register as sick." In order to facilitate the use of this variable in a logistic regression analysis, the responses of "Yes, somewhat clear significance," "Yes, clear significance," and "Yes, it is the reason why I had to register as sick" were aggregated into a single category of "Yes" (coded as 1). In contrast, the response of "No, no significance" was coded as 0. Thus, the resulting variable represents whether the patient experienced any tinnitus- or hyperacusis-related reduction in their ability to perform at work.

The current study also added a question to evaluate the existing sick leave status of patients suffering from tinnitus and hyperacusis, where the question got labelled as Work Handicap (WH). This measure offers respondents various options such as no sick leave, retired, partially or entirely disabled, graduated or partially on sick leave, 100% on sick leave, and under capacity for work assessment. The response categories "No" and "No, I am retired" were consolidated and assigned a score of 0. Conversely, the response categories "No, I am partially or completely disabled," "Yes, I am graduated or partially on sick leave,"

"Yes, 100% on sick leave," and "Under capacity-for-work assessment" were amalgamated into a solitary category of "Yes, I am absent from work," which was assigned a score of 1. This assimilation of response categories was implemented to expedite the scoring process and augment the distinction between individuals absent from work and those who are not. Importantly, the binary coding of these variables allowed them to readily be used as outcomes in logistic regression analyses. This research confers insights into their vocational status and health by assessing tinnitus and hyperacusis patients' existing sick leave status.

Potential effect modifiers or confounders

This study relies on two distinct statistical samples: inpatients and outpatients with tinnitus and hyperacusis. Including both groups captures a broader range of variability, representing a more diverse population. The use of samples with differing symptom complexities provides a more comprehensive understanding of the relationship between tinnitus, hyperacusis, and reduced work capacity, highlighting their impact on individuals.

To address potential bias from unequal group proportions, the patient group (indicating sample type) was included as a covariate in all statistical analyses. This adjustment improves generalisability by estimating relationships as if the group variable were constant, reducing the influence of sample differences on the results.

Data analysis

The present study used partial correlation to investigate factors associated with tinnitus and hyperacusis, such as mental distress, additional physical and psychological complaints, and stress, while controlling for the patient group. Logistic regression was employed to determine the relationship between work ability and work handicap with these factors, as well as with tinnitus, awareness of tinnitus, and hyperacusis, while also controlling for the patient's group. The results were reported using odds ratios (ORs) as effect sizes. The (α-) level for statistical significance was set to .05. The statistical analysis was performed using the Jamovi program (version 2.2.5), and the data were de-identified prior to analysis. The analysis in this study also included several crucial assumption checks, such as the Shapiro-Wilk normality test, model fit measures, the omnibus Likelihood Ratio test, Variance Inflation Factor (VIF), and predictive measures. The assumption check statistics are only mentioned below in case they indicate any violation of assumption.

Table 1. Sample demographics.

Charateristic	Total (100 %)
Female	64 (50.4 %)
Outpatients	80 (62.9 %)
Age in years (mean)	52.42, SD = 12.16
Employed individuals	109 (85.8 %)

Note. Figure represent number of cases with percent value in paranthesis, except for age where they represent mean and SD. Occupation codes excluded unemployed participants and those with an unidentifiable occupation.

Results

Demographic

Table 1 presents descriptive data for 127 patients (50.4% female, 49.6% male) who participated in the study, with an average age of 52.4 years (SD= 12.19). The total number of outpatients in this study were 80, and the total inpatients was 47. The majority of participants (80%) reported having one or more additional physical and psychological complaints. Table 2 displays the scores on the self-reported questionnaires.

Hyperacusis status

The results indicate that many patients suffering from tinnitus and, or hyperacusis experience challenges in coping with sounds in everyday life. Specifically, the results show that 61 patients (48%) have regular difficulties handling sounds that others find pleasant. Furthermore, the study shows that a total of 81 patients (64%) often experience pain or discomfort due to sounds. These findings suggest that hyperacusis may have a negative impact on a patient's ability to cope and handle sounds in daily life. Of the 127 patients who participated in the study, 48 (37.8%) were identified as having a hyperacusis handicap based on having an HQ score of 22 or higher (Aazh and Moore 2017). The HQ scores ranged from 0 to 42, with these values representing the limits of the scale. Some participants in the study reported extreme scores of 0 and 42.

Tinnitus status

The majority of patients reported experiencing tinnitus as a result of stress (33.9%) and exposure to loud noise (37%), with fewer patients reporting a *whiplash* injury (6.3%), head trauma (9.4%) or other causes (29.9%). Based on the total THI scores and the limits proposed by Newman, Jacobson, and Spitzer (1996), most participants had severe tinnitus handicap (33%), while some had

Table 2. Descriptive statistics of all outcome measures.

	Patient group	Mean	SD
THI	inpatients	63.74	19.76
	outpatients	32.38	21.36
HQ	inpatients	25.34	8.89
	outpatients	13.85	8.85
HADS	inpatients	17.34	9.12
	outpatients	9.09	7.15
TSCHQ: Is tinnitus affected by stress	inpatients	0.96	0.20
	outpatients	0.66	0.48
TSCHQ: Awareness of the tinnitus	inpatients	74.77	23.05
	outpatients	51.51	28.94
TSCHQ: Additional physical and psychological complaints	inpatients	0.96	0.20
	outpatients	0.70	0.46
Work ability	inpatients	0.96	0.20
	outpatients	0.45	0.50
Work handicap	inpatients	0.68	0.47
	outpatients	0.29	0.46

moderate (22.8%) or mild (25.9%) tinnitus handicap, and a few participants (18%) reported no tinnitus handicap.

Capacity for work and absence from work

The study found that almost half of the patients (43.3%) were absent from work, due to not specified illnesses or retirement. Moreover, the study revealed that 81 participants (63.7%) experienced a reduced capacity to work because of tinnitus or hyperacusis. Among the 127 participants, teachers constituted a relatively large group with a total of 15 individuals, whereas most other professions were represented by only 1–5 individuals.

Correlations between hyperacusis, tinnitus, and psychological factors in patients

This study utilised partial correlations while controlling for patient groups, as indicated above. The results indicated significant correlations between hyperacusis, as measured by the total HQ scores and tinnitus, as measured by the total THI scores. Tinnitus was also significantly correlated with mental distress, as measured by the total HADS scores and with physical and psychological complaints, as measured by one item in the TSCHQ. Tinnitus was found to correlate significantly with the participant's awareness of tinnitus, as measured by one item in the TSCHQ. However, no significant relationship was found between tinnitus levels and whether the tinnitus was perceived as being affected by stress (as measured by one item in the TSCHQ).

Regarding hyperacusis, a statistically significant correlation was observed between hyperacusis and mental distress. There was also a significant correlation between hyperacusis and additional physical and psychological complaints. Partial correlations between factors related to tinnitus and hyperacusis are presented in Tables 3 and 4.

Predicting work capacity in tinnitus and hyperacusis patients

A logistic regression analysis was conducted to identify factors predicting reduced work capacity, with Work Ability as the dependent variable. The predictors included THI, HQ, HADS, and various elements from the TSCHQ, such as tinnitus-related stress, awareness of tinnitus, and additional physical and psychological complaints.

The logistic regression model accounted for 65% of the variance in the Work Ability (WA) scores (Nagelkerke R^2), and accurately classified 85% of the cases, significantly predicting the participant's capacity for work (X^2 (7, $N = 127$) = 81.09, $p < .001$). The model also revealed a significant association between tinnitus, as measured by the THI, and work capacity, as measured by the WA scores. The regression showed that each point increase in THI score entails a 1.07 times greater risk of experiencing reduced work capacity due to tinnitus or hyperacusis (OR = 1.07, 95% CI [0.03, 1.20]). Regarding the relationship between hyperacusis measured by the total HQ score and WA, there was also a statistically significant association. The regression showed that each point increase in HQ score entails a 1.13 times greater risk of reduced work capacity (OR = 1.13, 95% CI [1.04, 1.23]). Other predictors such as mental distress, stress, awareness of tinnitus, and additional physical and psychological complaints did not predict work capacity. Regression results are reported in Table 5.

Predicting work absence in tinnitus and hyperacusis patients

Another logistic regression analysis was employed to identify predictors for work absence. Only 36% of the variance in the absence of work scores could be explained by this regression (Nagelkerke R^2). The model correctly classified 75% of the cases

Table 3. Partial correlation.

Partial correlation		THI	HQ	HADS	TSCHQ: Is tinnitus affected by stress	TSCHQ: Awareness of the tinnitus	TSCHQ: Additional physical and psychological complaints
THI	Pearson's r	—					
	p value	—					
HQ	Pearson's r	.51	—				
	p value	< .001	—				
HADS	Pearson's r	.74	.55	—			
	p value	< .001	< .001	—			
TSCHQ: Is tinnitus affected by stress	Pearson's r	.14	.13	.09	—		
	p value	.126	.138	.323	—		
TSCHQ: Awareness of the tinnitus	Pearson's r	.42	.16	.28	−.02	—	
	p value	< .001	.071	.001	.832	—	
TSCHQ: Additional physical and psychological complaints	Pearson's r	.23	.28	.18	−.01	.10	—
	p value	.010	.002	.039	.915	.245	—

Note. Controlling for Patient group (inpatients vs. outpatients)

Table 4. Partial correlation (with * instead of *p* values).

Partial correlation		THI	HQ	HADS	TSCHQ: Is tinnitus affected by stress	TSCHQ: Awareness of the tinnitus	TSCHQ: Additional physical and psychological complaints
THI	Pearson's r	—					
HQ	Pearson's r	.51**	—				
HADS	Pearson's r	.74**	.55**	—			
TSCHQ: Is tinnitus affected by stress	Pearson's r	.14	.13	.09	—		
TSCHQ: Awareness of the tinnitus	Pearson's r	.42**	.16	.28**	−.02	—	
TSCHQ: Additional physical and psychological complaints	Pearson's r	.23*	.28**	.18*	−.01	.10	—

Note. Controlling for Patient group (inpatients vs. outpatients).
**$p < .01$;
*$p < .05$

Table 5. Model coefficients – work ability.

Predictor	Estimate	95% Confidence interval Lower	Upper	SE	Z	*p*	Odds ratio
Intercept	−1.51	−4.19	1.17	1.37	−1.11	.268	0.22
Patient group: Inpatients vs. outpatients	−1.63	−3.43	0.18	0.92	−1.76	.078	0.20
THI	0.06	0.02	0.11	0.02	2.72	.007	1.07
HQ	0.13	0.04	0.21	0.04	3.00	.003	1.13
HADS	−0.02	−0.13	0.09	0.06	−0.40	.691	0.98
TSCHQ: Is tinnitus affected by stress	−0.33	−1.53	0.87	0.61	−0.54	.591	0.72
TSCHQ: Awareness of the tinnitus	0.00	−0.02	0.02	0.01	0.14	.892	1.00
TSCHQ: Additional physical and psychological complaints	−0.68	−1.98	0.61	0.66	−1.03	.301	0.51

Note. Estimates represent the log odds of "Work ability = 1" vs. "Work ability = 0"

Table 6. Model coefficients – work handicap.

Predictor	Estimate	95% Confidence interval Lower	Upper	SE	Z	p	Odds ratio
Intercept	−3.14	−5.47	−0.81	1.19	−2.64	.008	0.04
THI	−0.00	−0.04	0.03	0.02	−0.21	.832	1.00
HQ	0.08	0.02	0.14	0.03	2.60	.009	1.08
HADS	−0.04	−0.13	0.05	0.05	−0.85	.393	0.96
TSCHQ: Awareness of the tinnitus	0.02	0.00	0.04	0.01	2.28	.022	1.02
TSCHQ: Is tinnitus affected by stress	0.69	−0.49	1.88	0.60	1.15	.250	2.00
TSCHQ: Additional physical and psychological complaints	0.75	−0.48	1.99	0.63	1.19	.233	2.13
Patient group: inpatients vs. outpatients	−0.42	−1.53	0.68	0.57	−0.75	.454	0.66

Note. Estimates represent the log odds of "Work handicap = 1" vs. "Work handicap = 0"

and significantly predicted the participant's work absence (X^2 (7, $N = 115$) = 36.41, $p < .001$). There was a substantial relationship between scores on hyperacusis and work absence. Specifically, a 1-point increase in the total HQ score was associated with a 1.08 times greater risk of absence from work (OR= 1.08, 95% CI [0.02, 0.14]). Similarly, awareness of tinnitus was also related to work absence (OR = 1.02, 95% CI [0.00, 0.04]). However, work absence was not predicted by other factors such as THI, HADS, stress (TSCHQ), and additional physical and psychological complaints (TSCHQ). Regression results are reported in Table 6.

Discussion

To better understand the co-occurrence and severity of tinnitus and hyperacusis, as well as their impact on work capacity, this study investigated patients with both conditions and identified factors associated with tinnitus and hyperacusis. It simultaneously investigated these factors' connections to work capacity and work absence. The findings are consistent with previous research indicating substantial comorbidity between tinnitus and hyperacusis (Cederroth et al. 2020).

Assessing factors in tinnitus and hyperacusis patients

Many authors have acknowledged and highlighted the association between anxiety, depression, tinnitus, and hyperacusis (Cederroth et al. 2020; Aazh and Moore 2017). This study also found significant correlations between tinnitus and mental distress, as well as between hyperacusis and mental distress. These results are consistent with previous research reporting associations between anxiety, depression, hyperacusis, and tinnitus, although different measurement instruments were used in the present study compared to those in Salazar et al. (2019) and Aazh and Moore (2017). Notably, the present study found that the association between tinnitus and mental distress ($r = .74$, $p = <.001$) was numerically stronger than the association between hyperacusis and mental distress ($r = .55$, $p = <.001$).

The present study identified a statistically significant association between tinnitus and various physical and psychological symptoms, consistent with previous research. Several studies have similarly linked tinnitus to headaches, temporomandibular joint (TMJ) disorders, and neck pain (De Meulemeester et al. 2023; Vielsmeier et al. 2012). Furthermore, the study found that hyperacusis was also significantly associated with physical and psychological symptoms, eg., headaches, vertigo/dizziness, jaw disturbance, neck pain, and pain syndromes. Schecklmann et al. (2014) discovered that individuals with both tinnitus and hyperacusis exhibited a higher prevalence of pain and vertigo disorders than those with only tinnitus. De Meulemeester et al. (2023) demonstrated that hyperacusis severity increases when patients experience comorbid symptoms such as headaches, jaw disorders, neck pain, and tinnitus. In this study, however, the study sample was recruited from rehabilitation stays and audiological clinics, where patients sought assistance for their tinnitus and hyperacusis, something that individuals with milder symptoms might not have done. It is interesting to note that many of these patients, who first sought help for hearing challenges, also reported a substantial incidence of physical and psychological complaints. This indicates a complex relationship between tinnitus, hyperacusis and general health.

Factors influencing capacity to work

This investigation is among the first to scrutinise the impact of tinnitus and hyperacusis on work capacity. More than 50% of the patients stated that their capacity to work was affected by tinnitus and hyperacusis.

The logistic regression analysis of WA revealed that the severity of both tinnitus and hyperacusis (quantified by the THI and HQ, respectively), predicted reduced work capacity.

Notably, hyperacusis and tinnitus were also associated with mental distress, but when controlling for tinnitus and hyperacusis, mental distress was not a predictor of work capacity or work absence. It is worth considering the possibility that the impact of tinnitus or hyperacusis on work capacity may contribute to the

development of anxiety or depression. It is plausible that individuals experiencing tinnitus and hyperacusis may become depressed, or experience anxiety due to their reduced ability to perform effectively at work.

The discussion surrounding workplace stress is an important topic due to its association with reduced job satisfaction, lower organisational commitment, and an intention to leave the profession prematurely (Peter et al. 2022). These consequences can exacerbate existing workforce shortages. Previous research has demonstrated that stress can impact work capacity and may be related to symptoms such as tinnitus and hyperacusis (Cederroth et al. 2020; Peter et al. 2022). The present study did not measure stress per se, but whether the participants experienced that their tinnitus or hyperacusis was affected by stress. This variable did not associate with work capacity, at least not in our analysis which controlled for several potentially related factors. Neither did it correlate with the severity of tinnitus nor the severity of hyperacusis, suggesting that that stress might affect these conditions regardless of severity.

The findings of this study are consistent with previous research, including the following work by Paulin et al. (2019), which suggests that people with hyperacusis may struggle with annoying sounds, potentially affecting their job performance. The increased sensitivity to noise in hyperacusis can make it challenging to stay productive and negatively impact overall work performance. The present study provides valuable insights into how individuals with tinnitus and hyperacusis perceive their work capacity.

Being correlational, the present study does not focus on establishing a causal relationship between the variables under investigation. However, it is essential to acknowledge that previous research has proposed potential explanations for how tinnitus and hyperacusis could affect daily life. For instance, concentration difficulties associated with tinnitus (Fackrell et al. 2022; Aazh and Moore 2017) and the potential influence of annoying sounds in the workplace could contribute to reduced work capacity (Paulin et al. 2019). Nonetheless, further investigation is necessary to understand the relationship between tinnitus and hyperacusis and their implications for work capacity.

Factors influencing absence from work

As noted by Simons et al. (2023), tinnitus can affect the ability to recover at home between workdays due to work-related fatigue and distress. This is further compounded by the issues highlighted by Watts et al. (2018), such as problems getting to sleep and the need to either seek out or avoid noisy and quiet situations. The results of the current study provide insights into significant factors affecting work capacity. It is worth noting that a considerable proportion of the patients in the study were absent from work, either due to sick leave, social security, or work capacity assessments. A central finding in this study is that hyperacusis, as assessed by the Hyperacusis Questionnaire (HQ), emerges as a significant predictor of work absence. HQ as a significant predictor of work absence underscores the specific impact of hyperacusis on work capacity and the need for targeted interventions to support individuals with this condition in the workplace.

It is important to highlight that the participant pool in this study consisted of individuals actively seeking healthcare services to address their hyperacusis-related concerns. Significantly, a substantial portion of the participants were recruited from hospitals as outpatients, while another group comprised individuals undergoing treatment for their condition as inpatients at rehabilitation centres. Their voluntary decision to seek medical assistance due to tinnitus with or without hyperacusis indicates a significant level of discomfort and impairment associated with their condition. Of these, 38% satisfied the diagnostic cut off value of 22 on the HQ.

By actively engaging with healthcare professionals and seeking specialised treatment, these individuals demonstrate the gravity and impact of their hyperacusis-related issues on their daily lives. It is essential to acknowledge their initiative in seeking medical care and their willingness to participate in this study, as it underscores the significant impact of hyperacusis on their well-being and the importance of addressing this condition within the healthcare system.

The current study's findings are consistent with previous research conducted by Jüris et al. (2013), which similarly observed a high prevalence of work absence in individuals with hyperacusis. It is worth noting that they used different measures from the present study; among other things, a clinical interview was used to collect data on occupation and sick leave. Nonetheless, the current findings support the implications of hyperacusis on work-related functioning and emphasise the need for interventions that address these challenges.

Previous research has demonstrated that tinnitus often leads to sick leave and disability pension (Trochidis et al. 2021, p. 2). Individuals with hearing loss and tinnitus are more likely to take sick leave than individuals from the general population (Jørgensen et al. 2022). The present study found no statistically significant impact of tinnitus on work absence after controlling for other factors. However, higher THI scores were associated with a greater likelihood of perceiving reduced work capacity. It is important to note that the study's definition of reduced work capacity does not imply an inability to work but instead addresses capacity reductions specifically related to tinnitus or hyperacusis. In contrast, work absence encompasses absences for any reason, which may explain why tinnitus severity impacts perceived work capacity but not work absence.

The analysis also revealed an association between increased attention to tinnitus and work absence, suggesting that individuals who are more aware of their tinnitus are more likely be absent from work. It is also important to note that the analyses of work capacity and work handicap did not include the same set of participants as participants who reported that they were retired were excluded from the analysis of work handicap. Previous research has found that tinnitus may indicate challenges for patients in obtaining and maintaining employment (Trochidis et al. 2021). Notably, the severity and impact of tinnitus on an individual's work capacity may vary depending on factors such as the frequency, intensity, and duration of the tinnitus (Bauer 2018) and the individual's psychological and emotional response to it (Hesser, Bånkestad, and Andersson, 2015).

Reduced work capacity will not only be a consequence for the individual but also the employer. This consequence entails a need for accommodation from the employer and possibly the Norwegian Labour and Welfare Administration (NAV) if the patient is to be productive and on par with the rest of the population. This accommodation may also possibly prevent any sick leave if it were to occur; even though tinnitus in this study did not show any significant relationship to absence from work, we don't know if the connection is absent or present but simply too weak to be detectable in the 127 participants. Therefore, an individualised approach to assessing the impact of tinnitus on work

capacity is necessary, considering each individual's unique circumstances and needs.

Limitations

Utilising a cross-sectional design and employing two different samples, the present study sought to investigate the plausible association between tinnitus, hyperacusis, and work capacity. Though, it is imperative to duly acknowledge several factors that may engender constraints on the validity and generalisability of the study findings.

The two samples in this study represent distinct populations with unique characteristics, which may introduce biases and influence the outcomes. Despite efforts to control for confounding variables, there may still be residual differences between the samples, including variations in how bothered patients are by tinnitus and hyperacusis. The data collection spanned two periods, with the first coinciding with COVID-19 restrictions. These circumstances, including mobility restrictions and changes in healthcare and economic conditions, may have influenced participants' experiences and availability.

The study's sample exhibited an overrepresentation of specific occupations, which may pose a limitation to its generalisability and broader applicability. Previous research has indicated that certain professions, such as musicians and teachers, are at an elevated risk for developing hyperacusis (Sacchetto et al. 2022, p. 2). Notably, the teaching profession constitutes a larger group compared to other occupations in this present study. Conversely, the study includes only a small number of individuals employed in fields such as agriculture, construction, and automotive. Consequently, this study does not provide insight into the potential risks for these types of occupations. Interestingly, a recent Australian study found that work with dangerous noise levels, which include agriculture, construction, and the automotive industry, is associated with a higher risk of developing tinnitus (Lewkowski et al. 2022, p. 189).

Conclusions

In conclusion, this study established a significant association between tinnitus, hyperacusis, and work capacity through logistic regression analysis. Moreover, the findings highlight the substantial role of hyperacusis as a predictor of work absence within this population. These results emphasise the importance of recognising the impact of hyperacusis on individuals' capacity to work and the potential implications for those experiencing tinnitus and hyperacusis. The findings of this study suggest that professionals working with individuals affected by tinnitus and hyperacusis should prioritise addressing issues related to work capacity and work absence. This implies the importance of developing strategies and interventions to effectively manage and support individuals in maintaining their work performance and minimising the impact of these conditions on their occupational functioning.

Further research

It may be interesting to investigate whether reducing work absence among patients with hyperacusis is possible by offering workplace accommodations, such as limiting the noise levels in the work environment or offering sound masking. This way, the work environment can be more tailored to the patients, and they can have better opportunities to continue working despite their condition. It may also be essential to investigate the impact of work absence on patients' lives and well-being in the Norwegian population and whether it may negatively affect their financial situation and social life. Furthermore, it could be valuable to look at tinnitus and hyperacusis in neurodiverse individuals.

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No potential conflict of interest was reported by the author. We have used ChatGPT-4 in selected parts of the text for linguistic clarity and precision.

References

Aazh, H., and B. C. J. Moore. 2017. "Factors Associated With Depression in Patients With Tinnitus and Hyperacusis." *American Journal of Audiology* 26 (4):562–569. https://doi.org/10.1044/2017_AJA-17-0008.

Baguley, D., D. McFerran, and D. Hall. 2013. "Tinnitus." *Lancet (London, England)* 382 (9904):1600–1607. https://doi.org/10.1016/S0140-6736(13)60142-7.

Baguley, D., G. Andersson, D. McFerran, and L. McKenna. 2018. *Tinnitus: A Multidisciplinary Approach*. 2nd ed. Hoboken, NJ: Wiley Professional, Reference & Trade.

Bauer, C. A. 2018. "Tinnitus." *The New England Journal of Medicine* 378 (13):1224–1231. https://doi.org/10.1056/NEJMcp1506631.

Bhatt, J. M., N. Bhattacharyya, and H. W. Lin. 2017. "Relationships Between Tinnitus and the Prevalence of Anxiety and Depression." *The Laryngoscope* 127 (2):466–469. https://doi.org/10.1002/lary.26107.

Cederroth, C. R., A. Lugo, N. K. Edvall, A. Lazar, J.-A. Lopez-Escamez, J. Bulla, I. Uhlen, D. J. Hoare, D. M. Baguley, B. Canlon, et al. 2020. "Association Between Hyperacusis and Tinnitus." *Journal of Clinical Medicine* 9 (8):2412. https://doi.org/10.3390/jcm9082412.

De Meulemeester, K., M. Meeus, I. Dhooge, A. Taevernier, M. Van Elslander, B. Cagnie, D. Lenoir, and H. Keppler. 2023. "Comparing Tinnitus, Pain, Psychosocial and Cognitive Factors Between Patients with Tinnitus and Pain: A Systematic Review." *Journal of Psychosomatic Research* 168: 111201. https://doi.org/10.1016/j.jpsychores.2023.111201.

De Ridder, D., W. Schlee, S. Vanneste, A. Londero, N. Weisz, T. Kleinjung, G. S. Shekhawat, A. B. Elgoyhen, J.-J. Song, G. Andersson, et al. 2021. "Tinnitus and Tinnitus Disorder: Theoretical and Operational Definitions (An International Multidisciplinary Proposal)." In *Progress in Brain Research*, edited by Winfried Schlee, Berthold Langguth, Tobias Kleinjung, and Sven Vanneste. Vol. 260, 1–25. Amsterdam: Elsevier. https://doi.org/10.1016/bs.pbr.2020.12.002.

Fackrell, K., M. Sereda, S. Smith, J. Sheldrake, and D. J. Hoare. 2022. "What Should Be Considered When Assessing Hyperacusis? A Qualitative Analysis of Problems Reported by Hyperacusis Patients." *Brain Sciences* 12 (12):Artikkel 12. https://doi.org/10.3390/brainsci12121615.

Friberg, E., U. Rosenhall, and K. Alexanderson. 2013. "Sickness Absence Due to Otoaudiological Diagnoses; A Descriptive Nationwide Study." *BMC Public Health* 13 (1):635. https://doi.org/10.1186/1471-2458-13-635.

Hall, D. A., S. Zaragoza Domingo, L. Z. Hamdache, V. Manchaiah, S. Thammaiah, C. Evans, and L. L. N. Wong, International Collegium of Rehabilitative Audiology and TINnitus Research NETwork. 2018. "A Good Practice Guide for Translating and Adapting Hearing-Related Questionnaires for Different Languages and Cultures." *International Journal of Audiology* 57 (3):161–175. https://doi.org/10.1080/14992027.2017.1393565.

Hesser, H., E. Bånkestad, and G. Andersson. 2015. "Acceptance of Tinnitus As an Independent Correlate of Tinnitus Severity." *Ear and Hearing* 36 (4):e176–e182. https://doi.org/10.1097/AUD.0000000000000148.

Jørgensen, A. Y., L. Aarhus, B. Engdahl, B. Bratsberg, V. F. Skirbekk, and I. S. Mehlum. 2022. "Hearing Loss, Sick Leave, and Disability Pension: Findings from the HUNT Follow-Up Study." *BMC Public Health* 22 (1): 1340. https://doi.org/10.1186/s12889-022-13760-2.

Jüris, L., G. Andersson, H. C. Larsen, and L. Ekselius. 2013. "Psychiatric Comorbidity and Personality Traits in Patients with Hyperacusis." *International Journal of Audiology* 52 (4):230–235. https://doi.org/10.3109/14992027.2012.743043.

Khalfa, S., S. Dubal, E. Veuillet, F. Perez-Diaz, R. Jouvent, and L. Collet. 2002. "Psychometric Normalization of a Hyperacusis Questionnaire." *ORL; Journal for Oto-Rhino-Laryngology and Its Related Specialties* 64 (6): 436–442. https://doi.org/10.1159/000067570.

Langguth, B., R. Goodey, A. Azevedo, A. Bjorne, A. Cacace, A. Crocetti, L. Del Bo, D. De Ridder, I. Diges, T. Elbert, et al. 2007. "Consensus for Tinnitus Patient Assessment and Treatment Outcome Measurement: Tinnitus Research Initiative Meeting, Regensburg, July 2006." In *Progress in Brain Research*, edited by B. Langguth, G. Hajak, T. Kleinjung, A. Cacace, and A. R. Møller (Red.), Vol. 166, 525–536. Amsterdam: Elsevier. https://doi.org/10.1016/S0079-6123(07)66050-6.

Larsen, L., T. S. Gjendem, K. Svevad, and G. E. Nielsen. 2021. "Validation of the Norwegian Adaptation of Khalfa's Hyperacusis Questionnaire and Psychological distress in Norwegian Hyperacusis Patients." *Hearing Balance and Communication* 19 (3):197–202. https://doi.org/10.1080/21695717.2021.1943775.

Lewkowski, K., J. Heyworth, E. Ytterstad, W. Williams, H. Goulios, and L. Fritschi. 2022. "The Prevalence of Tinnitus in the Australian Working Population." *The Medical Journal of Australia* 216 (4):189–193. https://doi.org/10.5694/mja2.51354.

Newman, C. W., G. P. Jacobson, and J. B. Spitzer. 1996. "Development of the Tinnitus Handicap Inventory." *Archives of Otolaryngology-Head & Neck Surgery* 122 (2):143–148. https://doi.org/10.1001/archotol.1996.01890140029007.

Paulin, J., M. Nordin, M.-H. Nyback, and S. Nordin. 2019. "Associations between Hyperacusis and Psychosocial Work Factors in the General Population." *International Archives of Occupational and Environmental Health* 92 (1):59–65. https://doi.org/10.1007/s00420-018-1356-x.

Peter, K. A., C. Golz, R. A. Bürgin, M. Nübling, C. Voirol, S. J. Zürcher, and S. Hahn. 2022. "Assessing the Psychosocial Work Environment in the Health Care Setting: Translation and Psychometric Testing of the French and Italian Copenhagen Psychosocial Questionnaires (COPSOQ) in a Large Sample of Health Professionals in Switzerland." *BMC Health Services Research* 22 (1):608. https://doi.org/10.1186/s12913-022-07924-4.

Sacchetto, L., E. Apa, A. Ciorba, S. Palma, V. Caragli, C. Gherpelli, D. Monzani, E. Genovese, and R. Nocini. 2022. "Psychological Profile and Social Behaviors of Patients with Hyperacusis." *Journal of Clinical Medicine* 11 (24):Artikkel 24. https://doi.org/10.3390/jcm11247317.

Salazar, J. W., K. Meisel, E. R. Smith, A. Quiggle, D. B. McCoy, and M. R. Amans. 2019. "Depression in Patients with Tinnitus: A Systematic Review." *Otolaryngology-Head and Neck Surgery: official Journal of American Academy of Otolaryngology-Head and Neck Surgery* 161 (1):28–35. https://doi.org/10.1177/0194599819835178.

Schecklmann, M., M. Landgrebe, and B. Langguth, TRI Database Study Group. 2014. "Phenotypic Characteristics of Hyperacusis in Tinnitus." *PloS One* 9 (1):e86944. https://doi.org/10.1371/journal.pone.0086944.

Shan, A., J. S. Ting, C. Price, A. M. Goman, A. Willink, N. S. Reed, and C. L. Nieman. 2020. *Hearing Loss and Employment: A Systematic Review of the Association Between Hearing Loss and Employment Among Adults*. Cambridge: Cambridge University Press.

Simons, I. A., T. Goderie, B. I. Lissenberg-Witte, N. J. Versfeld, S. E. Kramer, and M. F. van Wier. 2023. "The Effects of Tinnitus and Tinnitus Annoyance on need for Recovery After Work: Results of the Netherlands Longitudinal Study on Hearing." *Journal of Occupational Health Psychology* 28 (2):123–135.

Sørensen, M., G. E. Nielsen, and L. Larsen. 2020. "A Preliminary Validation of a Norwegian Version of the Tinnitus Sample Case History Questionnaire." *Scandinavian Journal of Psychology* 61 (4):549–559. https://doi.org/10.1111/sjop.12605.

Trochidis, I., A. Lugo, E. Borroni, C. R. Cederroth, R. Cima, D. Kikidis, B. Langguth, W. Schlee, and S. Gallus. 2021. "Systematic Review on Healthcare and Societal Costs of Tinnitus." *International Journal of Environmental Research and Public Health* 18 (13):6881. https://doi.org/10.3390/ijerph18136881.

Tyler, R. S., M. Pienkowski, E. R. Roncancio, H. J. Jun, T. Brozoski, N. Dauman, N. Dauman, G. Andersson, A. J. Keiner, A. T. Cacace, et al. 2014. "A Review of Hyperacusis and Future Directions: Part I. Definitions and Manifestations." *American Journal of Audiology* 23 (4):402–419. https://doi.org/10.1044/2014_AJA-14-0010.

Vielsmeier, V., J. Strutz, T. Kleinjung, M. Schecklmann, P. Kreuzer, M. Landgrebe, and B. Langguth. 2012. "Temporomandibular Joint Disorder Complaints in Tinnitus: Further Hints for a Putative Tinnitus Subtype." *PloS One* 7 (6):e38887. https://doi.org/10.1371/journal.pone.0038887.

Watts, E. J., K. Fackrell, S. Smith, J. Sheldrake, H. Haider, and D. J. Hoare. 2018. "Why Is Tinnitus a Problem? A Qualitative Analysis of Problems Reported by Tinnitus Patients." *Trends in Hearing* 22:2331216518812250. https://doi.org/10.1177/2331216518812250.

Zigmond, A. S., and R. P. Snaith. 1983. "The Hospital Anxiety and Depression Scale." *Acta Psychiatrica Scandinavica* 67 (6):361–370. https://doi.org/10.1111/j.1600-0447.1983.tb09716.x.