

# Associations Between Patient-Reported Handicap Scores for Dizziness, Hearing, and Tinnitus

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## Introduction

- Dizziness, hearing loss, and tinnitus are three common chief complaints described by patients to Otolaryngologists.
- Initial evaluation of each of these three symptoms is history-driven.
- Self-reported symptom handicap questionnaires specific to dizziness, hearing loss, and tinnitus have been demonstrated to be sensitive and effective tools for assessing these symptoms.
- However, the relationships between these three handicap inventories have not been studied to date.
- Here we aim to explore these relationships, correlate handicap inventory scores with presenting patient complaints, and compare hearing handicap scores with hearing loss severity noted in clinic Audiology reports.
- We further aim to identify any relationship between patient-reported handicap severity and factors of age and gender.

## Methods

- Cross-Sectional Study Design
- Adults patients presenting to Otolaryngology clinic (N= 96)
  - Aged 60 years and older
  - Non-ambulatory patients were excluded
- Each patient completed the following standardized questionnaires:
  - Dizziness Handicap Inventory—Screening Form (DHI-S)
  - Hearing Handicap Inventory—Screening Form (HHI-S)
  - Tinnitus Handicap Inventory—Screening Form (THI-S).
- Each Handicap Inventory consists of 10 questions with 3 answer choices (“Yes,” “Sometimes,” and “No”), each assigned a value of 4, 2, and 0 points, respectively.
- Scores range from 0 to 40 points, with increasing score denoting increasing severity of symptom handicap.
  - 0-8 suggests no handicap
  - 10-24 suggests mild-moderate handicap
  - 26-40 suggests significant handicap
  - Comparisons may also be made between scores < 10 (no handicap present) and ≥ 10 (handicap present).
- For each patient, clinical notes were reviewed to identify complaints of dizziness/imbalance, hearing loss, and tinnitus at the time of questionnaire completion.

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## References

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## Results

### Patient Characteristics

Variable	All (n=96)	Female (n=55)	Male (n=41)	p-value for F vs. M
Age, Median (IQR)	71.5 (67, 81)	72 (67, 82)	71 (67, 80)	0.491
Hearing Loss, N (%)				0.182
No	4 (4.2)	1 (1.8)	3 (7.3)	
Yes	92 (95.8)	54 (98.2)	38 (92.7)	
Patient Complaints, N (%)				
Dizziness or Imbalance	79 (82.3)	50 (90.9)	29 (70.7)	<b>0.01</b>
Hearing Loss	40 (41.7)	27 (49.1)	13 (31.7)	0.09
Tinnitus	41 (42.7)	24 (43.6)	17 (41.5)	0.83

Table 1. Patients presenting to clinic did not differ significantly by median age between men and women. There was a high predominance of hearing loss in this population, though no difference between men and women. Patient complaints of dizziness/imbalance, hearing loss, and tinnitus were common among all patients, with a higher rate of dizziness complaints by women (p < 0.05).

### Handicap Inventory Scores by Gender

Variable	Female (n=55)	Male (n=41)	p-value for F vs. M
DHI-S, N (%)			
<10	37 (67.3)	35 (85.4)	<b>0.043</b>
≥10	18 (32.7)	6 (14.6)	
HHI-S, N (%)			
<10	21 (38.2)	19 (46.3)	0.423
≥10	34 (61.8)	22 (53.7)	
THI-S, N (%)			
<10	44 (80.0)	32 (78.1)	0.816
≥10	11 (20.0)	9 (22.0)	

Table 2. Handicap inventory scores were compared between men and women using Chi-square tests. For Dizziness inventory scores, significantly more women had scores ≥10 (p < 0.05). Tinnitus and Hearing inventory scores were not significantly different between men and women.

### Handicap Inventory Scores by Patient Complaints

Variable	Patient Complaints	All	Yes	No	p-value
DHI-S, Median (IQR)	Dizziness or Imbalance	2 (0, 9)	6 (2, 16)	0 (0, 4)	<b>&lt;0.0001</b>
HHI-S, Median (IQR)	Hearing Loss	12 (5, 21)	14 (6, 22)	0 (0, 10)	<b>0.0004</b>
THI-S, Median (IQR)	Tinnitus	0 (0, 4)	4 (0, 16)	0 (0, 0)	<b>&lt;0.0001</b>

Table 3. Handicap inventory scores were compared on the basis of patients' presenting complaints of the related symptom. Patients who complained of the related symptom at clinical presentation showed higher median scores on the relevant handicap inventory (p < 0.05).

### Handicap Inventory Scores by Age

Handicap inventory scores were compared across age groups (60-69, 70-79, and >80). Using Chi-square testing, none of the handicap scores were significantly correlated with age (p > 0.05).

## Correlation Between HHI-S and Hearing Test Results

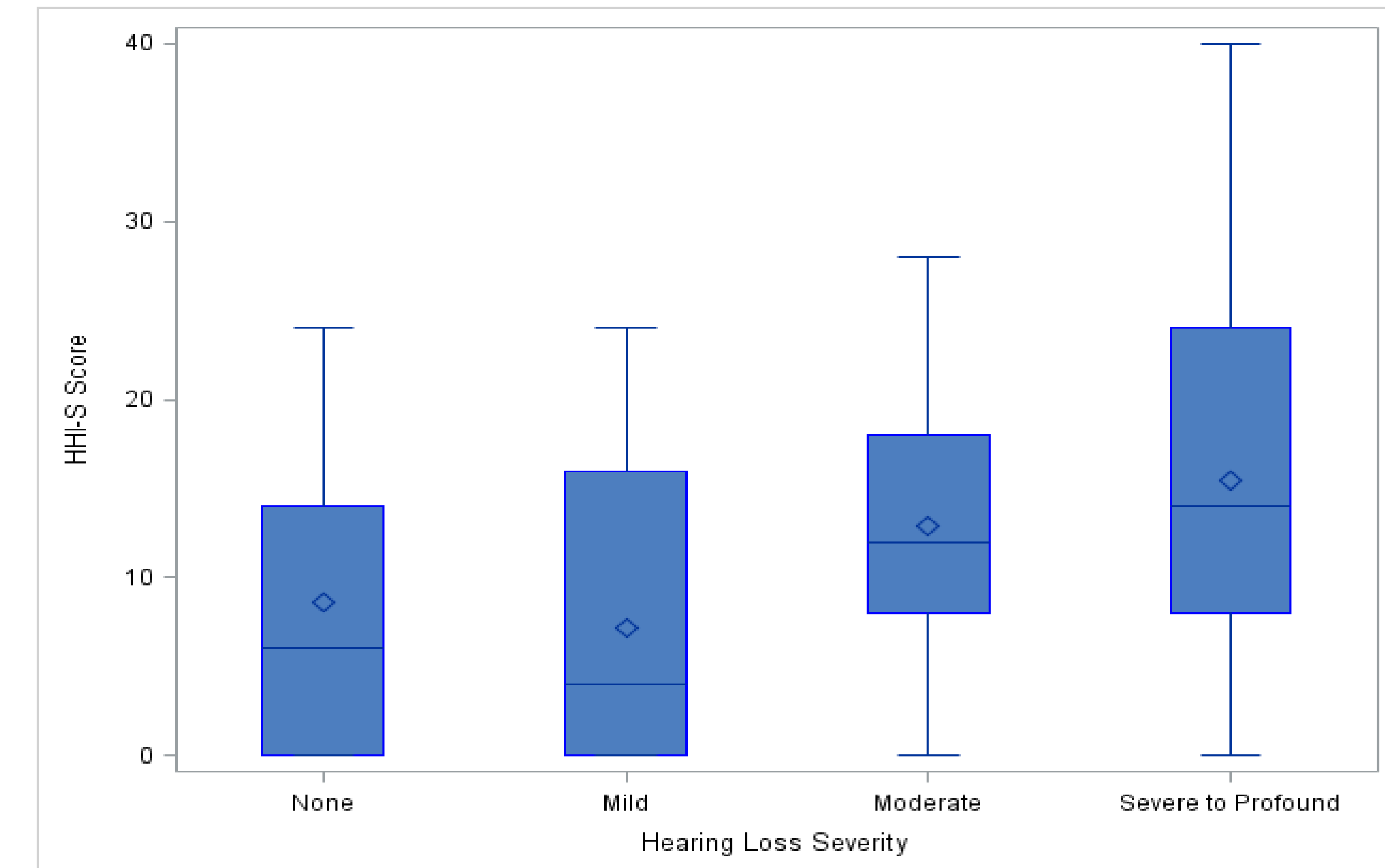


Figure 1. Based on individual patient Audiology Test reports, patients' hearing loss severity was categorized as either None, Mild, Moderate, or Severe to Profound. Severity of hearing loss was demonstrated to be positively correlated with HHI-S scores, trending toward statistical significance when treated categorically (p=0.07). When analyzed as continuous variables, the hearing loss severity and HHI-S demonstrated a positive Spearman correlation coefficient of 0.30 (p=0.0025).

## Correlation Between Handicap Inventory Scores

Handicap Inventory	DHI-S			P-value	
	0-8	10-24	>24		
HHI-S	0-8	37 (38.5)	3 (3.1)	0 (0.0)	<b>&lt;0.01</b>
	10-24	33 (34.4)	9 (9.4)	3 (3.1)	
	>24	2 (2.1)	7 (7.3)	2 (2.1)	
Handicap Inventory	THI-S			P-value	
	0-8	10-24	>24		
HHI-S	0-8	36 (37.5)	3 (3.1)	1 (1.0)	<b>&lt;0.01</b>
	10-24	36 (37.5)	8 (8.3)	1 (1.0)	
	>24	4 (4.2)	7 (7.3)	0 (0.0)	
Handicap Inventory	DHI-S			P-value	
	0-8	10-24	>24		
THI-S	0-8	64 (66.7)	10 (10.4)	2 (2.1)	<b>&lt;0.01</b>
	10-24	7 (7.3)	9 (9.4)	2 (2.1)	
	>24	1 (1.0)	0 (0.0)	1 (1.0)	

Table 4. Handicap inventory scores were compared with each other to evaluate for positive correlation. Each inventory was compared against the other two inventories using Spearman Correlation Coefficient analysis. Each score was positively correlated with the other two scores (p<0.01).

## Conclusion

- Each of the three Handicap Inventory forms provides meaningful quantitative information useful in the assessment of patients complaining of dizziness, hearing loss, and/or tinnitus.
- Increased scores on any one of the three handicap inventories were associated with increased scores on the other two handicap inventories.
- Any patient complaint of dizziness/imbalance, hearing loss, or tinnitus should prompt further questioning and evaluation of the two other symptoms.