Mental Health Status and Perceived Tinnitus Severity

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Veterans Benefits Administration (2012):

- **Tinnitus** represents 6.4% of **all** service-connected disabilities (~ 840,000 veterans).
  - Tinnitus is the single most common SC disability.
  - Hearing loss is the second most common SC disability.
- **Mental health disorders** represent 6.7% of **all** service-connected disabilities (~ 652,000 veterans). The most common MH disorders are:
  - Post-traumatic stress disorder (57% of all SC MH disabilities).
    - PTSD is the 3rd most prevalent single SC disability.
  - Major depressive disorder (11% of all SC MH disabilities).
  - Generalized anxiety disorder (6% of all SC MH disabilities).
Background: Relevance

- **Yankaskas (2012):** Up to 80% of military personnel exposed to noise may experience chronic tinnitus.

- **Salvi (2010):** Up to 50% of Iraq and Afghanistan veterans experience chronic tinnitus.

- **Folmer et al (2011):** The estimated tinnitus prevalence among veterans (11.9%) is over twice that of non-veterans (5.4%).

- **Litz & Schienger (2009):** “Studies to date suggest that 10-18% of combat troops serving in OEF/OIF have probable PTSD following deployment.”

- **Seal et al (2007):** “Of 103,788 OEF/OIF veterans seen at VA health care facilities, 25,658 (25%) received mental health diagnos(es); 56% of whom had 2 or more distinct mental health diagnoses.”

- **Folmer (2001):** The relationship between mental health and tinnitus appears to be bi-directional.
Progressive Tinnitus Management (PTM - Henry et al, 2005, 2008) identifies the precise level of tinnitus management (e.g., the least intensive) required for adequate relief.

PTM Levels (least to most intensive):
- Level 1 - Triage
- Level 2 - Audiological Evaluation
- Level 3 - Group Education
- Level 4 - Tinnitus Evaluation
- Level 5 - Individualized Management
Background: Earlier Findings

The prevalence of mental health disorders increases as the need for more intensive tinnitus management increases.

Subject Group

Figure 3: % of Subjects with Various Medical Diagnoses in Each Group

- Mental Health
- TBI
- Headache
- Dizziness
- Substance Abuse

Non-T
T-GrpN
T-GrpY-IndN
T-GrpY-IndY
Tinnitus patients with co-existing mental health diagnoses reported significantly greater tinnitus-related distress than those without ($p < .05$).

Current Study

Goals of this retrospective chart review study:

1. to further evaluate the relationship between mental health status and measures of perceived tinnitus severity;
2. to evaluate the utility of routine mental health screening as a tool in tinnitus management; and
3. to evaluate any differences in the effect of specific mental health disorders on measures of perceived tinnitus severity.
Data were collected from the VA Computerized Patient Record System (CPRS) between 1 Jan 2010 through 31 Oct 2011 (21 months).

All subjects were referred to the Atlanta VA Audiology Clinic for primary complaint of tinnitus.

All subjects had completed the first three levels of Progressive Tinnitus Management (PTM) and all appropriate actions associated with that level:

- **Level 1 – Triage**
- **Level 2 – Audiological Evaluation**
- **Level 3 – Group Education**
• Hearing aid status
  o Hearing aids being worn
  o Hearing aids not warranted

• Mental health status
  o Absence of MH diagnoses (NoMH)
  o Presence of MH diagnoses (YesMH)
    ▪ Number of diagnoses
    ▪ Specific diagnoses

• Measures of perceived tinnitus severity
  o Tinnitus Reaction Questionnaire (TRQ - Wilson et al, 1991)
  o Disturbance % (subjective estimate of the % of waking hours that tinnitus is disturbing)

• Measure of mental health status
  o Patient Health Questionnaire (PHQ9 - Kroenke et al, 2001)

• Age in years
  o Younger (< 41 )
  o Middle (41-56)
  o Older (57+ )
Perceived Tinnitus Severity

Tinnitus Reaction Questionnaire (TRQ)


<table>
<thead>
<tr>
<th>TRQ Score</th>
<th>Interpretation</th>
</tr>
</thead>
<tbody>
<tr>
<td>≤ 17</td>
<td>No significant tinnitus-related distress</td>
</tr>
<tr>
<td>18 - 69</td>
<td>Significant tinnitus-related distress</td>
</tr>
<tr>
<td>≥ 70</td>
<td>Significant psychological distress related to tinnitus</td>
</tr>
</tbody>
</table>
### Mental Health Status

#### Patient Health Questionnaire (PHQ9)


<table>
<thead>
<tr>
<th>Over the last 2 weeks, how often have you been bothered by any of the following problems or concerns?</th>
<th>Not at all</th>
<th>Several days</th>
<th>More than half the days</th>
<th>Nearly every day</th>
</tr>
</thead>
<tbody>
<tr>
<td>Little interest or pleasure in doing things.</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Feeling down, depressed or hopeless.</td>
<td></td>
<td></td>
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<tr>
<td>Trouble falling or staying asleep, or sleeping too much</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Feeling tired or having little energy.</td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Poor appetite or overeating.</td>
<td></td>
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<tr>
<td>Feeling bad about yourself — or that you are failure or have let yourself or your family down.</td>
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<tr>
<td>Trouble concentrating on things, such as reading the newspaper or watching television.</td>
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<tr>
<td>Moving or speaking so slowly that other people could have noticed. Or the opposite — being so fidgety or restless that you have been moving around a lot more than usual.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Thoughts that you would be better off dead, or of hurting yourself in some way.</td>
<td>Yes</td>
<td>No</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

#### PHQ9 Score | Depression Category
---|---
1-4 | Minimal
5-9 | Mild
10-14 | Moderate
15-19 | Moderately Severe
20+ | Severe
Tinnitus and Suicide Risk

33% of tinnitus patients reported that their tinnitus had led them to think of suicide at least “a little of the time.” There was no significant association between MH group and thoughts of suicide ($X^2 = 2.748, p > .05$).

Descriptive Statistics: n = 323

- No MH = 100 (30.9 %)
  - Mean age = 57.94 years (SD 9.86)
  - Aided Status
    - Hearing aids worn = 60 (60.0 %)
    - Hearing aids not indicated = 40 (40.0 %)
- Yes MH = 223 (69.1 %)
  - Mean age = 53.61 years (SD 9.94)
  - Aided Status
    - Hearing aids worn = 118 (52.9 %)
    - Hearing aids not indicated = 105 (47.1 %)
  - Mental Health Diagnoses
    - 1 MH diagnosis = 119 (53.4 %)
      - PTSD Only = 46
      - Depression Only = 50
      - Anxiety Only = 9
      - Other = 14
    - 2 MH diagnoses = 76 (34.1 %)
      - PTSD + Depression = 36
      - PTSD + Other = 16
      - Depression + Anxiety = 13
      - Other combinations = 11
    - 3+ MH diagnoses = 28 (12.6 %)
      - All but 2 had PTSD as one diagnosis
      - PTSD + Depression + Other = 19
      - Other combinations = 9

2 + MH Diagnoses (46.7 %)

All subjects were assigned to an Age Group

<table>
<thead>
<tr>
<th>Group</th>
<th>Age in Years</th>
<th>N</th>
</tr>
</thead>
<tbody>
<tr>
<td>Younger</td>
<td>≤ 50</td>
<td>98</td>
</tr>
<tr>
<td>Middle</td>
<td>51-60</td>
<td>110</td>
</tr>
<tr>
<td>Older</td>
<td>≥ 61</td>
<td>115</td>
</tr>
</tbody>
</table>
The relationship between mental health status and measures of perceived tinnitus severity: TRQ Scores

- **TRQ Scores** (n = 323)
  - A 3-Way ANOVA was completed
    - Independent Factors: Age Group, Hearing Aid Status and Mental Health Status
    - Dependent Factor: **TRQ Score**
  - The **Mental Health Status x Age Group** interaction was significant \((p = .017)\)
    - Holm-Sidak follow-up comparisons revealed:
      - The Yes-MH mean TRQ score significantly higher \((p < .001)\) than the No-MH TRQ score for:
        - Younger-Age: Cohen’s \(d = 0.88\) (large)
        - Older-Age: Cohen’s \(d = 0.57\) (medium)
      - The No-MH mean TRQ score for Middle-Age subjects significantly higher than that for Older-Age subjects.
        - Cohen’s \(d = 0.59\) (medium)
The relationship between mental health status and measures of perceived tinnitus severity: Disturbance %

- **Disturbance %** (n = 323)
  - A 3-Way ANOVA was completed
    - Independent Factors: Age Group, Hearing Aid Status and Mental Health Status
    - Dependent Factor: Disturbance %
  - Only the main factor of Mental Health Status was significant ($p = .001$)
    - The Yes-MH group’s mean Disturbance % was significantly greater than that of the No-MH subjects.
    - Cohen’s $d = 0.30$ (small)
The relationship between mental health status and measures of perceived tinnitus severity: PHQ9 Scores

- **PHQ9 Scores** (n = 82)
  - A 3-Way ANOVA was completed
    - Independent Factors: Age Group, Hearing Aid Status and Mental Health Status
    - Dependent Factor: **PHQ9 Score**
  - Only the main factor of Mental Health Status was significant ($p = .013$)
    - Cohen’s $d = 0.53$ (medium)

![Bar chart showing mean PHQ9 scores for mental health status](chart.png)
The relationship between mental health status and measures of perceived tinnitus severity

A **Multiple Linear Regression** was performed (n = 82).

**Independent Factors:** TRQ Score and Age in Years  
**Dependent Factor:** PHQ9 Score

<table>
<thead>
<tr>
<th>Age Years</th>
<th>0.063</th>
<th>TRQ</th>
<th>&lt; 0.001</th>
</tr>
</thead>
</table>

\[ \text{PHQ9} = 4.167 - (0.0817 \times \text{Age Years}) + (0.244 \times \text{TRQ}) \]

"Not all of the independent variables appear necessary. The following appear to account for the ability to predict PHQ9 (p < 0.05): TRQ."

Power of test (α = .05): 1.000

Pearson Product-Moment correlations were completed:

<table>
<thead>
<tr>
<th></th>
<th>TRQ</th>
<th>Disturbance</th>
</tr>
</thead>
<tbody>
<tr>
<td>PHQ9</td>
<td>0.785</td>
<td>0.586</td>
</tr>
<tr>
<td>TRQ</td>
<td>0.594</td>
<td></td>
</tr>
</tbody>
</table>

*All p < .001

**Pearson Product-Moment correlations**

- **PHQ9 Scores vs. TRQ Scores:**  \( r = 0.785 \)
- **PHQ9 Scores vs. Disturbance %:**  \( r = 0.586 \)
- **TRQ Scores vs. Disturbance %:**  \( r = 0.594 \)
Mental health screening to identify tinnitus patients who may benefit from referral to mental health

- PHQ9 Scores (n = 82)
  - Yes MH = 54
  - No MH = 28

<table>
<thead>
<tr>
<th>PHQ9 Score</th>
<th>Depression Category</th>
<th>Yes MH Count (%)</th>
<th>No MH Count (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1-4</td>
<td>Minimal</td>
<td>3 (6%)</td>
<td>5 (18%)</td>
</tr>
<tr>
<td>5-9</td>
<td>Mild</td>
<td>11 (20%)</td>
<td>8 (29%)</td>
</tr>
<tr>
<td>10-14</td>
<td>Moderate</td>
<td>8 (15%)</td>
<td>8 (29%)</td>
</tr>
<tr>
<td>15-19</td>
<td>Moderately Severe</td>
<td>15 (28%)</td>
<td>4 (14%)</td>
</tr>
</tbody>
</table>
| 20-27      | Severe              | 17 (31%)         | 3 (11%)         | **37%**  
|            |                     | **26%**          | **74%**         | **63%**  |

- Chi-Square test:
  - There was a significant relationship between MH group and PHQ9 depression category. (*p* < .05).
  - However, fully 63% of No-MH subjects’ PHQ9 scores placed them in the moderate-to-severe depression categories.
Two 3-Way ANOVAs were completed. The Independent Factors were:
MH Group x Age x Aided Status

The MH Groups were:
PTSD Only (n = 46)
Depression Only (n = 50)
PTSD + Depression (n = 36)

Dependent Factor: TRQ Scores
No comparisons were significant ($p > .05$)

Dependent Factor: Total Disturbance %
No comparisons were significant ($p > .05$)
Tinnitus Functional Index vs. PHQ9: Early Findings

- **n=80**
- \( r = 0.699 \) (\( p < .001 \))
- **Linear Regression:** \( TFI = 48.163 + (1.840 \times PHQ9) \)
- Power of performed test with \( \alpha = 0.050 \): 1.000
Conclusions

The relationship between mental health status and measures of perceived tinnitus severity

- 69% of tinnitus subjects had at least one mental health (MH) diagnosis.
  - 47% of those MH tinnitus patients had at least 2 MH diagnoses.
- Subjects with mental health diagnoses reported significantly greater tinnitus-related distress than those without.
  - Age and MH status interacted to significantly affect TRQ scores.
  - The mean Disturbance % was significantly higher for subjects with MH diagnoses than for those without.
  - There were highly significant and powerful correlations between scores on the TRQ, scores on the PHQ9 and Disturbance %.
The utility of routine mental health screening to identify patients who may benefit from referral for mental health services

- Mental health screening should be a routine part of the tinnitus evaluation.
  - YesMH subjects’ mean PHQ9 score was significantly higher than that of the NoMH subjects.
  - There was a significant relationship mental health group and severity of depression based on PHQ9 scores.
  - Fully 63% of NoMH subjects’ PHQ9 scores placed them in the moderate, moderately severe or severe depression categories.
Conclusions

Differences in the effect of specific mental health disorders on measures of perceived tinnitus severity

- The specific type of mental health disorder had no significant effect on two measures of perceived tinnitus severity.

  - There were no significant differences among the mean TRQ scores for subjects with PTSD Only, Depression Only or PTSD + Depression.

  - There were no significant differences among the mean Total Disturbance % values for subjects with PTSD Only, Depression Only or PTSD + Depression.
1. There is a positive relationship between mental health status and measures of perceived tinnitus severity. In general, as scores on the PHQ9 increased, TRQ scores and Disturbance % also increased.

2. Mental health screening should be included as a standard tool in tinnitus management.

3. There were no significant differences in the effect of specific mental health disorders (depression, anxiety, depression + PTSD) on measures of perceived tinnitus severity.
Questions or Comments?

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