

Mental Health Status, PHQ9 Scores and Tinnitus-Related Distress

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Introduction

The Department of Veterans Affairs (VA) reports that tinnitus is the most prevalent single service-connected (SC) disability among veterans, representing 6.1% of all SC disabilities (about 750,000 veterans).⁵ The estimated tinnitus prevalence among veterans (11.9%) is over twice that of non-veterans (5.4%).⁶ Mental health disorders represent 6.5% of all SC disabilities (about 800,000 veterans), the three most prevalent of which are PTSD (55.2%, the 4th most prevalent single SC disability), major depressive disorder (11.2%) and generalized anxiety disorder (6.7%).⁵

The neurophysiological model states that tinnitus disturbance is the result of negative activation of the limbic and autonomic nervous systems.¹¹ The limbic system regulates mood, emotion and motivation, and its dysfunction has been shown to result in various neuropsychiatric disorders, including psychosis, depression, obsessive-compulsiveness, anxiety and certain personality disorders,³ each of which has demonstrated a strong, positive relationship with tinnitus.^{1,4,7,8}

The relationship between mental health and tinnitus appears to be bi-directional,⁶ yet we were unable to identify any studies that examined any possible relationship between measures of mental health status and measures of perceived tinnitus severity. Although tinnitus subjects with mental health diagnoses report greater tinnitus-related distress than those without,² we could not identify any studies that evaluated whether there were any significant differences in the degree of reported tinnitus-related distress among groups of subjects diagnosed with specific mental health disorders.

Study Goals:	
1	Evaluate the relationship between mental health status and measures of tinnitus-related distress;
2	Evaluate the value of mental health screening as a standard tool in the audiological evaluation of the tinnitus patient.
3	Evaluate any differences in the effect of specific mental health disorders on measures of tinnitus-related distress.

Methods

Data were collected from the VA Computerized Patient Record System for patients referred to the Atlanta VA Audiology Clinic for primary complaint of tinnitus between 1 Jan 2010 through 31 Oct 2011 who had completed all appropriate actions associated with Levels 1, 2 and 3 of Progressive Tinnitus Management (PTM)^{9,10} :

Level 1 – Triage allows audiologists and non-audiologists to determine if a patient may require tinnitus-specific services.

Level 2 – Audiological Evaluation utilizes routine clinical procedures, an in-depth case history and various additional surveys to obtain health and tinnitus information to determine if additional audiology or other professional services are needed.

Level 3 – Group Education provides information regarding the nature and causes of tinnitus, instruction in the systematic implementation of interesting, soothing and background sounds to manage tinnitus disturbance and annoyance through contrast reduction along with the use of techniques for stress reduction, attention diversion and cognitive restructuring.

A total of 323 subjects were identified.

No Mental Health Diagnoses (No-MH) Group

n = 100 (31.0%) Mean age = 57.89 years (SD 9.9)
 Hearing aids: Worn = 59 (59.6%) Not Indicated = 40 (40.4%)

Existing Mental Health Diagnoses (Yes-MH) Group

n=223 (69.0%) Mean age = 54.7 years (SD 7.2)
 Hearing aids: Worn = 120 (53.3%) Not Indicated =105 (46.7%)

The mean age of the No-MH Group was significantly younger than that of the Yes-MH Group ($p < .05$). The table below shows that a significantly greater proportion of Yes-MH subjects were age 49 years or younger while a significantly greater proportion of No-MH subjects were age 50 or greater ($p < .05$).

Age (Years)	No-MH Group	Yes-MH Group
20-39	4 (4%)	23 (10%)
40-49	20 (20%)	78 (35%)
50-59	23 (23%)	44 (20%)
60+	53 (53%)	78 (35%)

Yes-MH Group Mental Health Diagnoses:

- **1 MH diagnosis = 118 (52.9%)**
 - PTSD = 46
 - Depression = 50
 - Anxiety = 9
 - All Other = 13
- **2 MH diagnoses = 77 (34.5%)**
 - PTSD + Depression = 38
 - PTSD + Anxiety = 6
 - Depression + Anxiety = 13
 - All Other combinations = 20
- **3+ MH diagnoses = 28 (12.6%)**
 - PTSD + Depression + Anxiety = 7
 - PTSD + Depression + Other = 9
 - PTSD + Other Combinations = 11
 - Other Combination = 1
- **2 + MH Diagnoses = 105 (47.1%)**

All subjects completed the *Tinnitus Reaction Questionnaire (TRQ)*¹³ and the *Patient Health Questionnaire (PHQ9)*.¹² Higher TRQ scores indicate greater tinnitus-related distress; higher PHQ9 scores indicate more frequent experience of depressive symptoms.

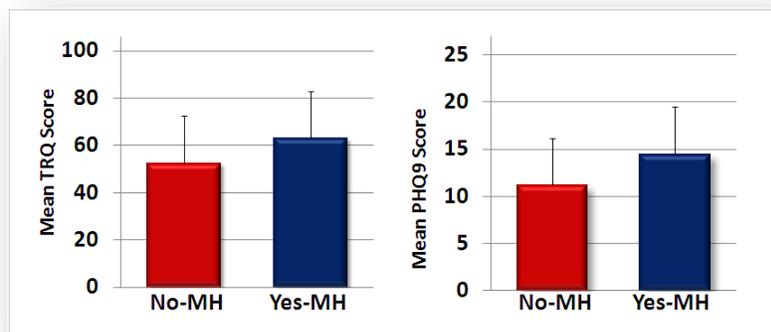
Percentage of the time you were awake that you were **AWARE** of your tinnitus: _____ %
 Percentage of the time you were aware of your tinnitus that it **DISTURBED** you: _____ %

TRQ	Not at all	A little of the time	Some of the time	A good deal of the time	Almost all of the time
1. My tinnitus has made me unhappy.					
2. My tinnitus has made me feel tense.					
3. My tinnitus has made me feel irritable.					
4. My tinnitus has made me feel angry.					
5. My tinnitus has led me to cry.					
6. My tinnitus has led me to avoid quiet situations.					
7. My tinnitus has made me feel less interested in going out.					
8. My tinnitus has made me feel depressed.					
9. My tinnitus has made me feel annoyed.					
10. My tinnitus has made me feel confused.					
11. My tinnitus has "driven me crazy".					
12. My tinnitus has interfered with my enjoyment of life.					
13. My tinnitus has made it hard for me to concentrate.					
14. My tinnitus has made it hard for me to relax.					
15. My tinnitus has made me feel distressed.					
16. My tinnitus has made me feel helpless.					
17. My tinnitus has made me feel frustrated with things.					
18. My tinnitus has interfered with my ability to work.					
19. My tinnitus has led me to despair.					
20. My tinnitus has led me to avoid noisy situations.					
21. My tinnitus has led me to avoid social situations.					
22. My tinnitus has made me feel hopeless about the future.					
23. My tinnitus has interfered with my sleep.					
24. My tinnitus has led me to think about suicide.					
25. My tinnitus has made me feel panicky.					
26. My tinnitus has made me feel tormented.					

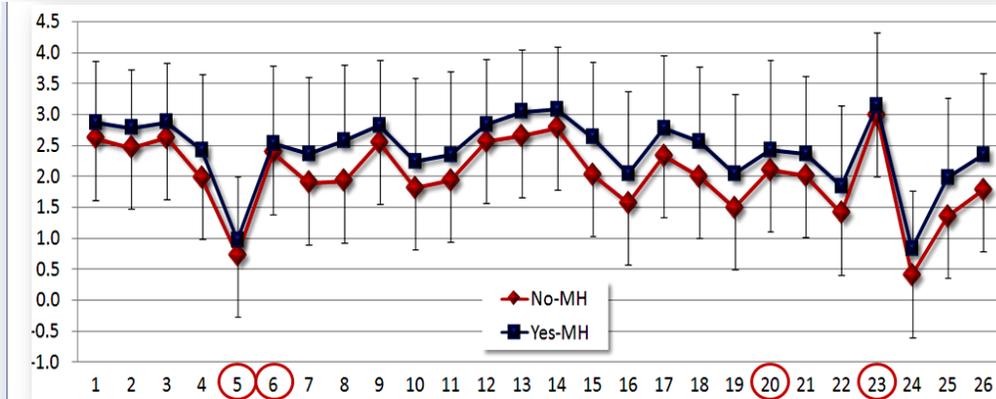
Over the last 2 weeks, how often have you been bothered by any of the following problems or concerns?

PHQ9	Not at all	Several days	More than half the days	Nearly every day
Little interest or pleasure in doing things.				
Feeling down, depressed or hopeless.				
Trouble falling or staying asleep, or sleeping too much				
Feeling tired or having little energy.				
Poor appetite or overeating.				
Feeling bad about yourself – or that you are failure or have let yourself or your family down.				
Trouble concentrating on things, such as reading the newspaper or watching television.				
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.				
Thoughts that you would be better off dead, or of hurting yourself in some way.				
In the past 2 years, have you felt depressed or sad on most days, even if you felt okay sometimes?	Yes	No		
If you checked off any of the above problems, how difficult have these problems made it for you to do your work, take care of things at home, or get along with other people?	Not difficult at all	Somewhat difficult	Very difficult	Extremely difficult

A 3-way ANOVA was performed (Age x Aided Status x MH Status) with TRQ score as the dependent factor. Only MH Status was significant ($p < .01$), indicated that MH Status had a medium effect on TRQ scores (Cohen's $d = 0.473$): subjects with mental health diagnoses scored significantly higher on the TRQ, indicating greater tinnitus-related distress, than those without. The Yes-MH Group's mean PHQ9 score was significantly higher ($p < .01$), indicating more frequent depressive symptoms, than that of the No-MH Group. MH Status also had a medium effect on PHQ9 scores (Cohen's $d = 0.492$).



Mean TRQ item responses were compared between the two MH groups. Significant differences ($p < .05$) were observed for *all* items except #5 (“tinnitus led me to cry”), #6 (“tinnitus led me to avoid quiet situations”), #20 (“tinnitus led me to avoid noisy situations”) and # 23 (“tinnitus interfered with my sleep”).

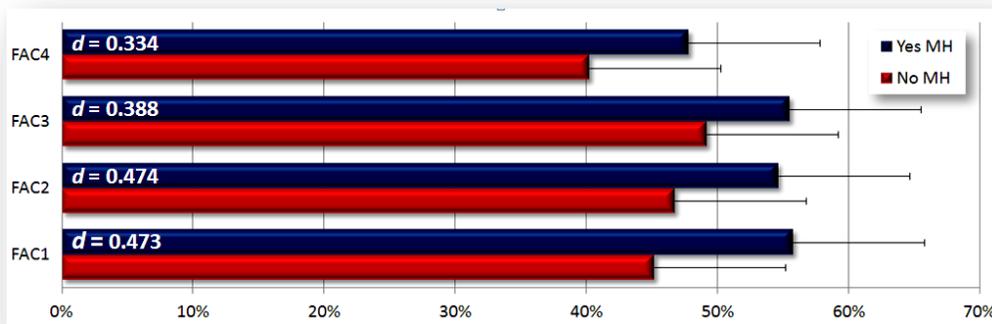


A series of separate 3-way ANOVAs then were performed (Age x Aided Status x MH Status) with the dependent factors:

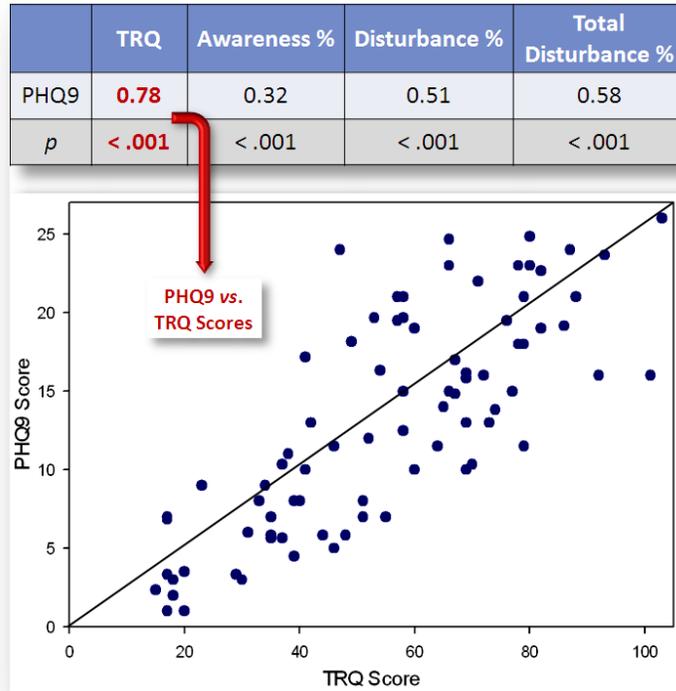
1. *Tinnitus Awareness %* (the percentage of waking hours that tinnitus was heard);
2. *Tinnitus Disturbance %* (the percentage of time tinnitus was heard that it was disturbing); and
3. *Total Disturbance %* ([Awareness % x Disturbance %], indicating the total percentage of waking hours tinnitus was disturbing).

For all ANOVAs, **no** factor nor combination of factors demonstrated a significant effect on any of the dependent factors.

Comparisons were made among mean TRQ Factor Scores between the two MH groups. For each TRQ Factor, the Yes-MH group’s mean score was significantly higher than that of the No-MH group ($p < .05$). MH Status had a small-to-medium effect on each TRQ Factor score (Cohen’s *d*, shown below). The TRQ Factors are shown in percentage of possible maximum score: *General Distress* (FAC1), *Work/Leisure Interference* (FAC2), *Severe Distress* (FAC3) and *Activity Avoidance* (FAC4).



Correlations were performed for TRQ scores vs. PHQ9 Scores, Awareness %, Disturbance %, and Total Disturbance (n = 83). All correlations were significant ($p < .01$). As TRQ scores increased, indicating greater perceived tinnitus-related distress), PHQ9 scores also increased, indicating greater depressive symptoms.



Yes-MH subjects were significantly more likely to experience greater frequency of depressive symptoms as evidenced by PHQ9 scores than No-MH ($p < .05$). However, it is clinically significant that fully 57% of No-MH subjects' PHQ9 scores placed them in the *moderate*, *moderately severe* or *severe* depression categories.

PHQ9 Score	Depression Category	No-MH Count (%)	Yes-MH Count (%)
1-4	Minimal	5 (18%)	4 (7%)
5-9	Mild	7 (25%)	11 (20%)
10-14	Moderate	9 (32%)	8 (15%)
15-19	Moderately Severe	4 (14%)	15 (27%)
20-27	Severe	3 (11%)	17 (31%)
		43%	27%
		57%	73%

One-way ANOVAs comparing TRQ and PHQ9 scores among MH sub-groups with specific mental health diagnoses were completed. The specific mental health sub-groups were *PTSD Only* (n = 46), *Depression Only* (n = 50) and *PTSD + Depression* (n = 38). Neither the mean TRQ scores nor the mean PHQ9 scores were significantly different among these three specific mental health groups ($p > .05$).

	PTSD Only	Depression Only	PTSD + Depression
TRQ Mean (SD)	63.04 (20.2)	65.38 (24.1)	67.50 (22.4)
PHQ9 Mean (SD)	15.15 (7.3)	19.61 (5.3)	14.78 (6.1)

CONCLUSIONS

- 1. Patients with diagnosed mental health disorders reported significantly greater tinnitus-related distress than those without.** Subjects with mental health diagnoses scored significantly higher on the TRQ than those without. There was a significant and powerful correlation between TRQ scores and PHQ9 scores.
- 2. Audiologists should consider including mental health screening as a routine part of PTM Level 2 – Audiological Evaluation.** Mean PHQ9 scores for subjects with mental health diagnoses were significantly higher than for those without, yet fully 57% of No-MH subjects' PHQ9 scores placed them in the *moderate, moderately severe or severe* depression categories, indicating need for referral for Mental Health referral.
- 3. The specific type of mental health disorder had no significant effect on at least one measure of perceived tinnitus-related distress.** There were no significant differences among mean TRQ scores or mean PHQ9 scores for groups of subjects diagnosed with *PTSD Only, Depression Only, or PTSD + Depression*.

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