



Temperament Measures for the Assessment of Tinnitus-Related Suffering

Michael Carpenter & Mandy Williams

University of South Alabama

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Did you know?

- 50 million people in the U.S. experience tinnitus
 - 12 million seek medical attention for tinnitus
 - 2 million have reduced quality of life due to related problems (e.g., anxiety, depression, sleep disorders)
- One area of tinnitus research has focused on the following observation... *for two patients that report similar descriptions of their tinnitus, one can live completely unaffected while the other is debilitated by the condition*
 - A psychological component appears to play a key role in why one patient suffers while another patient with similar self-described tinnitus does not suffer



Neurophysiological models

- Neurophysiological models illustrate the process of hearing, interpreting, and reacting to tinnitus as a function of the auditory, limbic, and autonomic nervous (ANS) systems
 - The auditory system provides the signal
 - The limbic system controls behaviors such as emotional expression, and motivational and mood states
 - It also influences the autonomic motor system
 - The sympathetic division of the ANS is responsible for the “fight or flight” process, which stimulates the heart, dilates the bronchi, contracts the arteries, and inhibits the digestive system
 - It prepares the body for action



In terms of tinnitus sufferers

- A highly-activated limbic system results in mood swings, the person being controlled by emotions, and adverse changes in hormone levels
 - This results in activation of the sympathetic ANS, which puts the body on alert and heightens awareness
- A highly-activated sympathetic ANS suppresses positive emotions causing patients to no longer enjoy life and to develop depression
 - This in turn reinforces activation of the limbic system
- This creates a “vicious circle” in which activation of these systems results in stress, anxiety, and loss of well-being



In terms of tinnitus sufferers

- Bottom line: a person can experience tinnitus and over time develop negative feelings towards it due to high activation of the limbic system and ANS
 - This idea is supported by evidence of successful therapy approaches (e.g., tinnitus habituation, cognitive-behavioral), in which counseling plays a critical role in effectively altering the patient's negative feelings and reactions to tinnitus
 - By habituating the negative reactions to tinnitus the patient is relieved of tinnitus-related suffering



Measuring tinnitus handicap

- Several tinnitus measurement scales have been developed that provide reliable data and valid interpretation of a tinnitus patient's current status
 - They reflect the patient's feelings on that particular day, which is particularly well-suited for monitoring changes in a patient's tinnitus (e.g., changes over time, measures for treatment effectiveness)
 - They yield little information as to how tinnitus sufferers and nonsufferers differ
 - They do not provide information that can identify patients predisposed to tinnitus-related suffering



Profiling tinnitus patients

- If tinnitus-related suffering does involve a psychological component, then perhaps sufferers share common personality profiles
 - Personality profile studies have found mixed results
- Tinnitus suffering involves the way in which the patient reacts to their tinnitus
 - Perhaps a better approach would be to determine if sufferers share common characteristics in how they react to particular experiences
 - In other words, do sufferers share common reaction traits to adverse situations and are they different from the patterns of nonsufferers?



What is temperament?

- Temperament, also referred to as “behavioral style”, measures the question of “how” an individual reacts, rather than the “why”
 - Research suggests temperament is an inherited physiology linked to specific behavioral and emotional reactions to new situations and unfamiliar events
 - Temperament may help determine how a person will cope with daily routines of living, stress, and illness
 - There is evidence of specific activation of the amygdala in specific temperament types
 - The amygdala is believed to be the primary area of limbic system activation involved in tinnitus-related suffering



New York Longitudinal Study

- The NYLS was a longitudinal study that followed 138 children for a period of six years
 - Parents were interviewed about the behavioral style of their children beginning when the children were 2 to 3 months old
 - Follow-up parent interviews were completed frequently
 - The data revealed 9 temperament dimensions
 - Evaluations with this population were continued through adolescence and into **adulthood**
 - This information was used to construct a brief, effective measure of adult temperament called the NYLS Adult Temperament Questionnaire (ATQ) (Chess & Thomas, 1995)



NYLS-ATQ

- Developed by Chess & Thomas (1995), the ATQ measures patient-reported temperament on 9 dimensions
 1. Activity Level
 2. Rhythmicity of Biological Cycles
 3. Adaptability
 4. Approach/Withdrawal
 5. Intensity of Emotional Reaction
 6. Mood
 7. Persistence
 8. Distractibility
 9. Sensory Threshold



Current study

- This study involves the collection and analysis of questionnaire data from patients with various degrees of tinnitus
- Participants completed the NYLS Adult Temperament Questionnaire and 2 traditional scales of tinnitus handicap (i.e., Tinnitus Handicap Questionnaire and Tinnitus Handicap Inventory)
 - The above scales are standardized and have gained acceptance by the research community in published work



Participants

- 16 adults
 - Mean age = 40.5 years (range = 22 – 71 years)
- Self-reported hearing status
 - 8 reported no hearing loss
 - 8 reported hearing loss (4 are current hearing aid users)
- Tinnitus occurrence
 - 9 participants with constant tinnitus
 - 7 participants with intermittent tinnitus (min 1 time/month)
- No participants had previously received tinnitus-specific therapy or counseling



Tinnitus Handicap Inventory

- Developed by Newman et al. (1996), the THI measures patient-reported tinnitus handicap on 3 dimensions
 - Functional subscale (11 items) reflects role limitations in the areas of mental functioning (e.g., item 1), social/occupational functioning (e.g., item 9), and physical functioning (e.g., item 7)
 - Emotional subscale (9 items) represents a broad range of affective responses to tinnitus, such as anger, frustration, and depression (e.g., items 3, 10, 21)
 - Catastrophic response subscale (5 items) reflects patients' desperation (item 5), inability to escape from tinnitus (item 8), perception of having a terrible disease (item 11), lack of control (item 19), and inability to cope (item 23)



Tinnitus Handicap Questionnaire

- Developed by Kuk et al. (1990), the THQ measures patient-reported tinnitus handicap on 3 dimensions
 - Factor 1 (15 items) reflects the effects of tinnitus on the patient's social (e.g., item 20), physical (e.g., item 17), and emotional behaviors (e.g., item 27)
 - Factor 2 (8 items) reflects the patient's hearing ability/difficulty related to tinnitus (e.g., item 4)
 - Factor 3 (4 items) reflects the patient's view if tinnitus had worsened (item 2), if the outlook was healthy (item 26), if help was available (item 27), and if other's were aware of the nature of tinnitus (item 8)
 - Factor 3 has been shown to have poor reliability as an individual measure and is not considered appropriate for clinical evaluation



THI descriptive statistics

Tinnitus Handicap Inventory

	N	Minimum	Maximum	Mean	Std. Deviation
Functional	16	.00	36.00	10.1250	9.97246
Emotional	16	.00	26.00	6.7500	9.11775
Catastrophic	16	.00	14.00	4.1250	4.41022
Total score	16	.00	76.00	21.0000	22.52110
Valid N (listwise)	16				

- The current population appears to represent a wide range of possible scores for each dimension and the total THI score
 - Possible score ranges:
 - Functional = 0 – 44
 - Emotional = 0 – 36
 - Catastrophic response = 0 – 20
 - Total score = 0 – 100
 - Higher scores represent greater tinnitus handicap



THQ descriptive statistics

Tinnitus Handicap Questionnaire

	N	Minimum	Maximum	Mean	Std. Deviation
Factor 1	16	.00	79.00	19.0833	21.44618
Factor 2	16	.00	83.33	24.6354	27.12353
Factor 3	16	1.25	80.00	40.4375	20.73594
Total score	16	.93	80.19	22.9630	20.42018
Valid N (listwise)	16				

- The current population appears to represent a wide range of possible scores for each dimension and the total THQ score
 - Possible score ranges:
 - Factor 1 = 0 – 100
 - Factor 2 = 0 – 100
 - Factor 3 = 0 – 100
 - Total score = 0 – 100
 - Higher scores represent greater tinnitus handicap



ATQ and THI correlations

Correlations

		Intensity	Mood	Functional	Emotional	Catastrophic	Total score
Intensity	Pearson Correlation	1	.664**	.459	.501*	.627**	.529*
	Sig. (2-tailed)		.005	.074	.048	.009	.035
	N	16	16	16	16	16	16
Mood	Pearson Correlation	.664**	1	.536**	.430	.471	.504*
	Sig. (2-tailed)	.005		.032	.096	.066	.047
	N	16	16	16	16	16	16
Functional	Pearson Correlation	.459	.536**	1	.937**	.818**	.983**
	Sig. (2-tailed)	.074	.032		.000	.000	.000
	N	16	16	16	16	16	16
Emotional	Pearson Correlation	.501*	.430	.937**	1	.780**	.973**
	Sig. (2-tailed)	.048	.096	.000		.000	.000
	N	16	16	16	16	16	16
Catastrophic	Pearson Correlation	.627**	.471	.818**	.780**	1	.874**
	Sig. (2-tailed)	.009	.066	.000	.000		.000
	N	16	16	16	16	16	16
Total score	Pearson Correlation	.529*	.504*	.983**	.973**	.874**	1
	Sig. (2-tailed)	.035	.047	.000	.000	.000	
	N	16	16	16	16	16	16

** Correlation is significant at the 0.01 level (2-tailed).

* Correlation is significant at the 0.05 level (2-tailed).

- Pearson product-moment correlations
 - Moderate to moderately-high positive correlations (i.e., between 0.4 and 0.7) were found for the temperament dimensions of Intensity and Mood with all 3 of the THI subscale scores and the THI total score



ATQ and THQ correlations

Correlations

		Intensity	Mood	Factor 1	Factor 2	Factor 3	Total score
Intensity	Pearson Correlation	1	.664**	.519*	.516*	.084	.509*
	Sig. (2-tailed)		.005	.039	.041	.758	.044
	N	16	16	16	16	16	16
Mood	Pearson Correlation	.664**	1	.440	.491	-.035	.425
	Sig. (2-tailed)	.005		.088	.053	.898	.101
	N	16	16	16	16	16	16
Factor 1	Pearson Correlation	.519*	.440	1	.789**	.529*	.974**
	Sig. (2-tailed)	.039	.088		.000	.035	.000
	N	16	16	16	16	16	16
Factor 2	Pearson Correlation	.516*	.491	.789**	1	.370	.880**
	Sig. (2-tailed)	.041	.053	.000		.158	.000
	N	16	16	16	16	16	16
Factor 3	Pearson Correlation	.084	-.035	.529*	.370	1	.614*
	Sig. (2-tailed)	.758	.898	.035	.158		.011
	N	16	16	16	16	16	16
Total score	Pearson Correlation	.509*	.425	.974**	.880**	.614*	1
	Sig. (2-tailed)	.044	.101	.000	.000	.011	
	N	16	16	16	16	16	16

** Correlation is significant at the 0.01 level (2-tailed).

* Correlation is significant at the 0.05 level (2-tailed).

- Pearson product-moment correlations
 - Moderate positive correlations (i.e., between 0.4 and 0.6) were found for the temperament dimensions of Intensity and Mood with THQ Factor 1, Factor 2, and the THQ total score



Intensity dimension

- Intensity was found to correlate with both the THI and THQ
 - Higher scores on these tinnitus questionnaires indicate greater perceived tinnitus handicap by the patient
 - Positive correlations indicate that patients who scored higher on the THI and THQ tend to score higher for Intensity
 - High Intensity score indicates high strength of emotional expression
 - Emotional reactions, even for minor concerns, may be loud/dramatic
 - The highly intense adult may express his/her excitement or displeasure openly and vehemently, and even wish he/she could 'keep cool' more easily
 - This finding appears to agree with the idea that tinnitus-related suffering occurs in individuals who report having strong neurophysiological reactions to their tinnitus



Mood dimension

- Mood was found to correlate with both the THI and THQ
 - Higher scores on these tinnitus questionnaires indicate greater perceived tinnitus handicap by the patient
 - Positive correlations indicate that patients who scored higher on the THI and THQ tend to score higher for Mood
 - High Mood score indicates a person who tends to be serious or even negative in quality of mood
 - His/her reactions more often lean toward distress or discomfort
 - Differences between real distress or acceptance may be indicated by such factors as length of time thinking about or pursuing an activity
 - This finding appears to agree with the idea that tinnitus-related suffering occurs in individuals who perceive tinnitus as a negative experience



Potential benefits of temperament

- Temperament may be influenced by the amygdala, which is believed to play a large role in tinnitus-related suffering
- Temperament is not a measure of tinnitus and as such does not reflect acute changes in the patient's perception of his/her tinnitus, unlike standard tinnitus measures
- Temperament generally remains stable throughout adulthood