Comparison of Temperament Measures & Self-Perceived Tinnitus Severity

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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 indivdiual 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

NYLS-ATQ

- Developed by Chess & Thomas (1995), the NYLS Adult Temperament Questionnaire (ATQ) measures patient-reported temperament on 9 dimensions

1. Activity Level
2. Rhythmicity of Biological Cycles (a.k.a., Regularity)
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 ATQ and 2 traditional scales of tinnitus handicap (i.e., Tinnitus Handicap Inventory and Tinnitus Handicap Questionnaire)
  - The above scales are standardized and have gained acceptance by the research community in published work
- For the purposes of this poster, data on the Tinnitus Handicap Questionnaire will not be discussed

Participants

- 27 adults
  - Mean age = 41.2 years (range = 19 – 71 years)
- Tinnitus occurrence
  - 15 participants with constant tinnitus
  - 12 participants with intermittent tinnitus (min 1 time/month)
- Self-reported hearing status
  - 13 reported no hearing loss
  - 13 reported hearing loss
  - 1 was unsure of their hearing status
- Previous tinnitus-specific therapy or counseling
  - 1 reported unsuccessful use of a tinnitus masker 15 years ago

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)

THI descriptive statistics

Tinnitus Handicap Inventory

	N	Minimum	Maximum	Mean	Std. Deviation
Functional	27	.00	36.00	8.5926	8.76733
Emotional	27	.00	26.00	5.4074	7.82137
Catastrophic	27	.00	14.00	4.3704	4.18926
Total score	27	.00	76.00	18.3704	19.54118
Valid N (listwise)	27				

- 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

ATQ and THI correlations

ATQ and THI Correlations

		Adaptability	Mood	Functional	Emotional	Catastrophic	Total score
Adaptability	Pearson Correlation	1	.455*	.499**	.425*	.281	.454*
	Sig. (2-tailed)		.017	.008	.027	.155	.017
	N	27	27	27	27	27	27
Mood	Pearson Correlation	.455*	1	.483*	.307	.270	.397*
	Sig. (2-tailed)	.017		.011	.120	.173	.040
	N	27	27	27	27	27	27
Functional	Pearson Correlation	.499**	.483*	1	.907**	.723**	.967**
	Sig. (2-tailed)	.008	.011		.000	.000	.000
	N	27	27	27	27	27	27
Emotional	Pearson Correlation	.425*	.307	.907**	1	.744**	.967**
	Sig. (2-tailed)	.027	.120	.000		.000	.000
	N	27	27	27	27	27	27
Catastrophic	Pearson Correlation	.281	.270	.723**	.744**	1	.836**
	Sig. (2-tailed)	.155	.173	.000	.000		.000
	N	27	27	27	27	27	27
Total score	Pearson Correlation	.454*	.397*	.967**	.967**	.836**	1
	Sig. (2-tailed)	.017	.040	.000	.000	.000	
	N	27	27	27	27	27	27

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

**. Correlation is significant at the 0.01 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 Adaptability and Mood with the several of the THI scores

Adaptability dimension

- Adaptability was found to correlate with the THI
  - Higher scores on the THI questionnaire indicates greater perceived tinnitus handicap by the patient
    - Positive correlations indicate that patients who scored higher on the THI tend to score higher for Adaptability
  - High Adaptability score indicates gradual acceptance of changes in circumstances
    - Higher scoring adults can have difficulty altering their usual reactions and may require an extended period to adjust
    - 'Sink or swim' approaches can be very difficult with these individuals
  - From a clinical perspective, this finding suggests that some tinnitus sufferers may require more lengthy periods of therapy as a function of how they react to tinnitus, rather than how they perceive tinnitus

Mood dimension

- Mood was found to correlate with the THI
  - Higher scores on the THI questionnaire indicates greater perceived tinnitus handicap by the patient
    - Positive correlations indicate that patients who scored higher on the THI 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

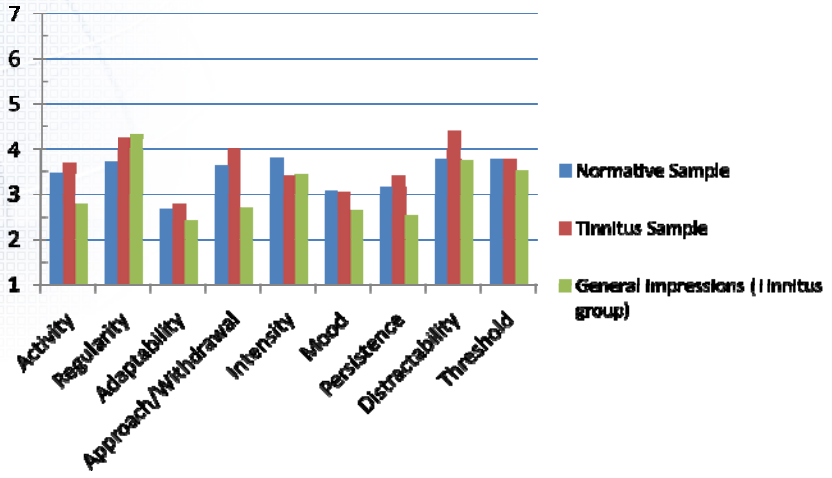
- Temperament may be influenced by the amygdala, which is believed to play a large role in tinnitus-related suffering
- Temperament is not a measure of tinnitus and as such does not reflect acute changes in the patient's perception of his/her tinnitus, unlike standard tinnitus measures
- Temperament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

Temperament raw scores

Temperament Dimension	ATQ Normative Sample (n=135)	Tinnitus Sample present study (n=27)	General Impressions from Tinnitus Sample (n=27)
Activity	3.47 (1.07)	3.69 (1.24)	2.78 (1.25)
Regularity	3.73 (1.33)	4.26 (1.38)	4.33 (1.04)
Adaptability	2.67 (0.91)	2.77 (1.01)	2.41 (0.89)
Approach	3.64 (1.03)	4.01 (1.09)	2.70 (0.82)
Intensity	3.80 (1.02)	3.40 (0.98)	3.44 (0.80)
Mood	3.08 (0.88)	3.04 (0.84)	2.63 (0.69)
Persistence	3.14 (0.93)	3.40 (0.90)	2.52 (1.01)
Distractibility	3.78 (0.95)	4.40 (1.16)	3.74 (1.40)
Threshold	3.79 (1.25)	3.78 (1.25)	3.52 (0.96)

Mean and Standard Deviations for ATQ Raw scores for ATQ normative sample (Chess & Thomas 2003) and the Tinnitus Sample Raw scores and General Impressions for each dimension

Temperament raw scores

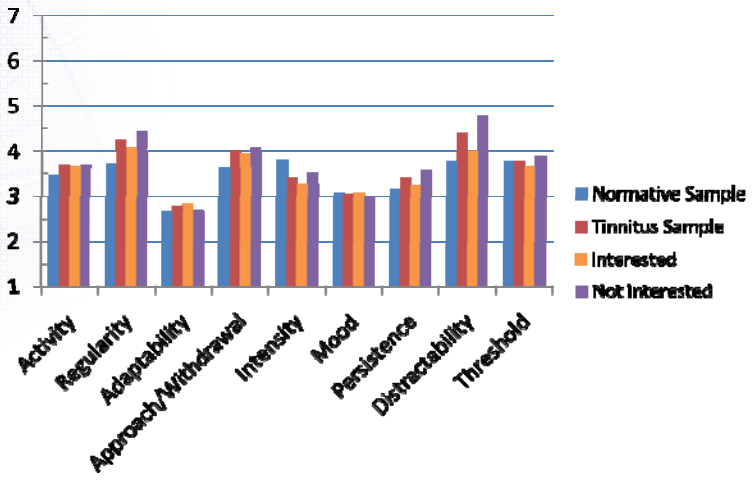


Interest in a tinnitus evaluation

Temperament Dimension	ATQ Normative Sample (n=135)	Tinnitus Sample present study (n=27)	Participants interested in a tinnitus evaluation (n=13)	Participants not interested in a tinnitus evaluation (n=14)
Activity	3.47 (1.07)	3.69 (1.24)	3.65 (0.94)	3.71 (1.50)
Regularity	3.73 (1.33)	4.26 (1.38)	4.07 (1.24)	4.44 (1.52)
Adaptability	2.67 (0.91)	2.77 (1.01)	2.85 (0.84)	2.69 (1.18)
Approach	3.64 (1.03)	4.01 (1.09)	3.95 (0.72)	4.07 (1.38)
Intensity	3.80 (1.02)	3.40 (0.98)	3.27 (0.98)	3.52 (0.99)
Mood	3.08 (0.88)	3.04 (0.84)	3.08 (0.78)	3.00 (0.91)
Persistence	3.14 (0.93)	3.40 (0.90)	3.22 (0.91)	3.57 (0.90)
Distractibility	3.78 (0.95)	4.40 (1.16)	3.99 (1.12)	4.79 (1.09)
Threshold	3.79 (1.25)	3.78 (1.25)	3.67 (1.26)	3.89 (1.32)

Mean and Standard Deviations of ATQ Raw scores for ATQ normative sample, Tinnitus sample, and Subsamples of participants interested vs. not interested in a tinnitus evaluation

Interest in a tinnitus evaluation

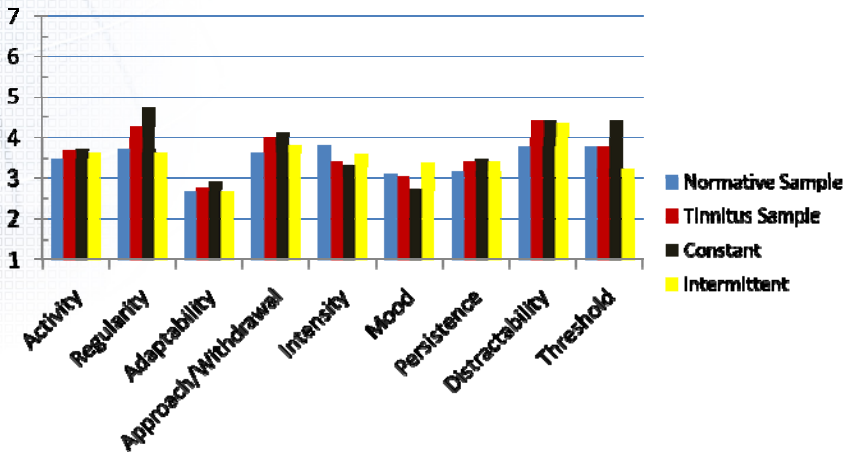


Constant vs. intermittent tinnitus

Temperament Dimension	Normative Sample ATQ (n=135)	Tinnitus Sample present study (n=27)	Constant Tinnitus (n=15)	Intermittent Tinnitus (n=12)
Activity	3.47 (1.07)	3.69 (1.24)	3.71 (1.31)	3.62 (1.25)
Regularity	3.73 (1.33)	4.26 (1.38)	4.74 (1.42)	3.63 (1.04)
Adaptability	2.67 (0.91)	2.77 (1.01)	2.94 (0.98)	2.67 (1.07)
Approach	3.64 (1.03)	4.01 (1.09)	4.12 (1.21)	3.83 (0.99)
Intensity	3.80 (1.02)	3.40 (0.98)	3.30 (1.18)	3.60 (0.70)
Mood	3.08 (0.88)	3.04 (0.84)	2.73 (0.95)	3.38 (0.60)
Persistence	3.14 (0.93)	3.40 (0.90)	3.46 (1.04)	3.39 (0.81)
Distractibility	3.78 (0.95)	4.40 (1.16)	4.42 (1.53)	4.36 (0.74)
Threshold	3.79 (1.25)	3.78 (1.25)	4.40 (1.14)	3.20 (1.19)

Mean and Standard Deviations for ATQ Normative Sample, Tinnitus sample, and Subsamples of participants with constant vs. intermittent tinnitus

Constant vs. intermittent tinnitus



Temperament dimensions of interest

- Distractibility
  - High score
    - Individual is easily interrupted by irrelevant sights, sounds, or movements
    - They may change activities to the distraction
  - Low score
    - Individual is rarely distracted by irrelevant events and the person may have difficulty discontinueing an activity or behavior even when asked to stop

Temperament dimensions of interest

- Regularity of Biological Cycles
  - High score
    - Individual most often shows irregularity in patterns of eating, sleeping, and elimination
    - For example, they may be hungry between meals or refuse to eat at mealtime
    - They have needs which are unscheduled or unanticipated
  - Low score
    - Individual maintains a significant regularity of eating, sleeping, and elimination
    - They may feel upset or disrupted by changes in their expected routine

Temperament dimensions of interest

- Threshold (a.k.a., Sensory Threshold)
  - High score (Sensitive)
    - Individual is more sensitive to sensory stimulation in his/her life
    - Tends to react strongly to light, sound, and touch with changes in behavior
    - Exciting sensory stimulation prior to sleep should be avoided
  - Low score (Nonsensitive)
    - Individual is relatively unaffected by sensory stimulation
    - May need higher levels of input before changes in his/her behavior are seen