Psychological Treatment for Tinnitus with Cognitive Therapy and Neurofeedback

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Cognitive behavioral therapy

- Tinnitus-Counselling, Psychoeducation
- Cognitive Restructuring
- Habituation
- Activation (pleasant activities) and Distraction
- Acceptance
- Relaxation (Jacobson, Breathing-relaxation, Biofeedback, etc.)
- Stress-Management
Cognitive behavioral therapy

Beliefs & Thoughts

Behavior

Emotions
# The A-B-C model of Cognitive Therapy

<table>
<thead>
<tr>
<th>Activating event</th>
<th>Beliefs</th>
<th>Consequences</th>
</tr>
</thead>
<tbody>
<tr>
<td>- Actual event</td>
<td>- Evaluations</td>
<td>- Emotions</td>
</tr>
<tr>
<td>- Patient’s immediate interpretations of event</td>
<td>- Rational</td>
<td>- Behaviors</td>
</tr>
<tr>
<td></td>
<td>- Irrational</td>
<td>- Other thoughts</td>
</tr>
</tbody>
</table>

**Example:**

| Tinnitus                             | „It never ends“  | Frustration                   |
|                                      | „It is getting worse“ | Depression                   |
|                                      |                  | Anxiety                       |
|                                      |                  | Avoidance of activities       |
Catch it – check it – change it!

<table>
<thead>
<tr>
<th>Cognitive Restructuring</th>
<th>Positive changes</th>
</tr>
</thead>
<tbody>
<tr>
<td>„I can do something to make it better“</td>
<td>- Feels more confident</td>
</tr>
<tr>
<td>„I can do relaxation“</td>
<td>- Self-efficacy</td>
</tr>
<tr>
<td>„I had already times, when the tinnitus was much more quiet“</td>
<td>- Less depressed</td>
</tr>
<tr>
<td>„When I go for a walk, it will be better“</td>
<td>- Less anxious</td>
</tr>
<tr>
<td>„I can do everything I want to, despite tinnitus.“</td>
<td>- More active (hobbys, social activities)</td>
</tr>
<tr>
<td></td>
<td>- Less focussing on tinnitus</td>
</tr>
<tr>
<td></td>
<td>- Habituation</td>
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</table>
Worksheet

Changing Thoughts and Feelings Worksheet

1. From the Tinnitus Problem Checklist, write down one bothersome tinnitus situation

2. Check one or more of the three skills to manage the situation
   - Relaxation exercises
   - Deep breathing
   - Imagery
   - Other

3. Write down the details for each skill you will use

4. Use your plan over the next week. How helpful was each exercise?
   - Not at all
   - A little
   - Moderately
   - Very much
   - Extremely

5. Comments
   When you find something that works well (or not so well) please comment. You do not need to wait 1 week to write your comments.

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Schmidt, 2017, National centre for rehabilitative auditory research, US
Cognitive Restructuring materials

Catch It, Check It, Change It

This is a simplified version of Cognitive Behavioural Therapy (CBT).

CBT is based on the idea that the way you see yourself, the world and other people can affect your thoughts and feelings, and can ultimately lead to mental health problems.

But through practice, you can learn to change the way you think, which can really help in improving your psychological positions and improving your mental wellbeing.

What we're offering here is only a very simple version, but it might be useful to understand your own thoughts.

Thoughts: They ignore me - they don't like me.

Emotions: Low, sad and rejected.

Actions: Go home and avoid people.

This relationship comes to a vicious cycle; the more negative your thoughts, the more depressed you might become, and the more depressed you are, the easier it is to believe quite unrealistic and depressing things.

Helpful / glass half full response: Someone isn't devaluing might have a more positive view of the situation.

Thoughts: They look a bit distracted...I wonder if there's something wrong?

Step 2 - Check it.

Stop and think about what you're thinking. Is it really true? Do you have evidence to back it up? Would others people interpret things in the same way? This is perhaps the most difficult part of the exercise as many everybody believes their own thoughts are right - think about arguments with friends about politics or football. It's very difficult to check out your own thoughts objectively. That's why CBT is best done with a therapist, who is much more able to take that "one step back" perspective.

Step 3 - Change it.

At this point you need to try substituting more realistic thoughts. If your automatic thoughts tend to be depressive or anxiety you need to think of different - but real - ways of viewing about.
Efficacy of CBT for tinnitus

<table>
<thead>
<tr>
<th>Meta-analysis</th>
<th>evidence</th>
<th>recommendation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Andersson &amp; Lyttkens, 1999. CBT</td>
<td>high</td>
<td>strong, evidence Ia</td>
</tr>
<tr>
<td>Martinez-Devesa et al, 2010, CBT</td>
<td>high</td>
<td>strong, evidence Ia</td>
</tr>
<tr>
<td>Cima et al., 2014, CBT</td>
<td>high</td>
<td>strong, evidence Ia</td>
</tr>
<tr>
<td>Kröner-Herwig et al., 1995, 2003; Zachriat &amp; Kröner-Herwig, 2004, CBT group</td>
<td>high</td>
<td>strong, evidence Ia</td>
</tr>
<tr>
<td>Zenner et al., 2013, CBT individual</td>
<td>high</td>
<td>strong, evidence Ia</td>
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</table>

Recommendation for CBT, S3-Guideline, AWMF online 2015

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Efficacy of CBT for tinnitus

  - Effect size Mini-TF12 prae-post: 2.85
  - Effect size Depression: 2.2
  - Effect size Anxiety: 1.8
Neurofeedback
Self-control of brainwaves
QEEG-Assessment
quantitative EEG to check abnormal
brainwave activity with tinnitus-patients

Male, 53a, Tinnitus since 5 years,
TF 17%, cognitive impairment 27%
Tinn.loudness VAS 8
HiBeta abnormality

Male, 39a, Tinnitus since 1 year,
TF 67%, emotional impairment 83%
Tinn.loudness VAS 6
Delta, Alpha abnormality
Alpha, HiBeta Neurofeedback
to promote habituation and cognitive restructuring
Alpha (tau) and delta neurofeedback to reduce tinnitus loudness


- Abnormal oscillatory brain (reduced alpha, raised delta)
- Involved network areas
  - Temporal areas / Sylvanian fissure (processing of perceptual features of tinnitus)
  - Frontal areas (cognitive processing)
  - Limbic areas (emotional processing)
Correlation of tinnitus-distress and alpha, delta frequency

Alpha reduced

Delta elevated

Fig. 1. Distribution of correlation coefficients between the tinnitus-related distress (score on the Tinnitus Questionnaire) and the power in alpha, delta, and a frequency index of both bands, respectively. Effects are largest for right temporal and left frontal sources. (Adapted with permission from Weisz et al., 2005.)
Efficacy of TDR Neurofeedback

Tau-Delta-Ratio neurofeedback
10 training sessions

Right Side:
Comparison of neurofeedback with frequency discrimination training

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Significant correlation of neurofeedback-success and reduction of tinnitus-loudness

![Graph showing correlation between neurofeedback and tinnitus loudness reduction](image)

Fig. 5. Correlation between the change in tau/delta power (y-axis; displayed as the tau/delta ratio after the training divided by the tau/delta ratio before the training) and the change in tinnitus intensity (y-axis; ratio between the intensity after the therapy and the intensity before the therapy). Values in tau/delta change above 1 (dashed line) indicate a high normalization (= enhancement of tau and/or reduction of delta), whereas slight values in tinnitus intensity reduction (under the dashed line) indicate large reduction. Two patients with large normalization show a tinnitus change of zero, indicating no tinnitus at post-training. The added line is the regression line with the regressor of tinnitus intensity reduction and the predictor of tau/delta change. These analyses are independent from the different feedback protocols.
Thank you for your attention

“The ringing in your ears—I think I can help.”

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