

# WIDEX ZEN THERAPY & WIDEX SOUNDRELAX™: A COMPILATION OF EVIDENCE

Written by Ditte Balslev, M.A. Speech & Hearing Sciences (2017)  
 Revised by Renate Olinger, M. Communication Pathology & Laura Winther Balling, Ph.D. (2023)

## INTRODUCTION

According to a recent study, approximately 740 million people experience tinnitus worldwide (Jarach et al., 2022). This corresponds to approximately 10% of the world population. Tinnitus is a growing concern in many circles. For example, tinnitus is the number one auditory disorder in veterans in the United States (U.S. Department of Veterans Affairs, 2021). As many as 70 - 90% of those with tinnitus also suffer from some degree of hearing loss, depending on the region. For the majority, attention paid to tinnitus decreases over time, and no treatment is needed. However, about 10 - 20% will seek professional attention (Tyler, 2000).

A range of approaches exist to help sufferers cope with tinnitus. Widely used strategies include Tinnitus Retraining Treatment (TRT) and Cognitive Behavioral Therapy (CBT). TRT entails sound therapy and instructional counseling (Jastreboff, 2000), while CBT focuses on managing the negative thoughts, emotions, and behaviors associated with the individual's tinnitus, including how these could potentially be altered. (Hyung & Moo, 2013). Since tinnitus can be a complicated source of distress affecting areas such as emotional state, concentration, anxiety, and sleep (Tyler, 2000), a strategy that targets multiple areas may be quite effective.

Widex has developed a comprehensive tinnitus management program to support tinnitus sufferers and the hearing care professionals helping them. The Widex Zen Therapy (WZT) program was first released in 2012, with the addition of the Widex SoundRelax™ sound therapy option in 2022.

## WIDEX ZEN THERAPY

Widex Zen Therapy (WZT) consists of four therapeutic strategies or components, each of which has been proven effective, either separately or in combination. Not every component is necessary for each client. However, by employing an integrated strategy, the hearing care professional has the opportunity to individualize treatment. The WZT components can be seen in Figure 1.

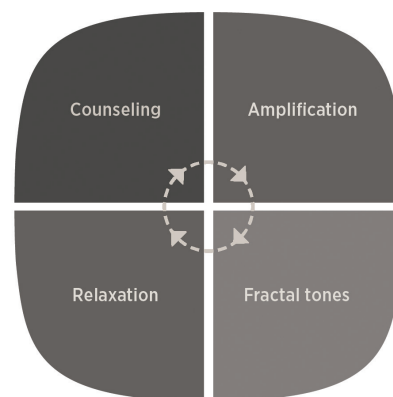


Figure 1: The components of Widex Zen Therapy

To individualize treatment, WZT stresses the importance of getting to know the client. In order to do so, an intake process, in which information is gathered on the nature of the tinnitus and the distress experienced, is performed prior to treatment. This process includes a comprehensive intake questionnaire and personal interview, subjective scale measures, and audiometric testing. The subjective scale measures are used both as a baseline in helping to determine the therapeutic strategy and later to

validate the effectiveness of the treatment. Two commonly used examples of subjective scales are the Tinnitus Handicap Inventory (THI, Newman et al., 1998), and the Tinnitus Functional Index (TFI, Meikle et al., 2012). Following the intake process, any or all of the components comprising WZT may be applied and individualized.

## COUNSELING

Counseling is used to educate the client with tinnitus and assist in altering the negative interpretation of the tinnitus. It may include instructional information about tinnitus and hearing in general and about the connection between tinnitus and emotional reactions as well as elements of adjustment-based counseling, which is termed Cognitive Behavioral Intervention (CBI) in the WZT program. The latter is a limited application of Cognitive Behavioral Therapy (CBT), a proven approach that helps clients identify negative thoughts and behaviors and replace them with more constructive ways of handling their situation (Cima et al., 2014). A Cochrane Review meta-analysis indicated that CBT produced “a significant improvement in depression score ... and quality of life (decrease of global tinnitus severity) ..., suggesting that CBT has a positive effect on the management (reduction of annoyance and distress) of tinnitus” (Martinez-Devesa et al., 2010). The American Academy of Otolaryngology, Head and Neck Surgery has also promoted CBT in their guidelines on tinnitus management as one of the only evidenced-based tinnitus therapies (Tunkel et al., 2014). The CBI approach included in the WZT program is a condensed version of CBT, focused on logical counseling well within the scope of practice of trained hearing care professionals.

## AMPLIFICATION

The usage of hearing aids (amplification) as a source of tinnitus relief has been investigated in several studies (Kikidis et al., 2021; Kochkin & Tyler, 2008; Searchfield et al., 2010; Trotter & Donaldson, 2008), which showed that about 60% of people with tinnitus experience relief from wearing hearing aids alone. Hearing aids can be very effective in decreasing the perception of tinnitus for a number of reasons. These include reducing the contrast between the tinnitus and silence, masking or partially masking tinnitus, and increasing auditory stimulation, which may minimize the brain's attempt to “overcompensate” for the lack of stimulation caused by hearing loss. Seeing as there

is a strong correlation between hearing loss and tinnitus, it is logical that treating the hearing loss with hearing aids can have a positive effect on tinnitus. Although the client may not view the hearing loss as the primary problem, amplification of soft sounds will act as a partial masker and, in many cases, produce some relief. Amplifying very soft sounds requires a hearing aid with low compression thresholds and high sound quality, which are characteristic of Widex hearing aids.

## FRACTAL SOUNDS

The Zen and Widex SoundRelax sounds are a patented source of sound therapy available in most Widex hearing aids. Zen includes tonal, chime-like sounds as well as the Zen broadband noise, while Widex SoundRelax adds more tonal styles as well as modulated wave-like sounds. The underlying principles of Zen and Widex SoundRelax are the same, but Widex SoundRelax sounds offer a softer sound and better synchronization between ears.

The tonal styles can be combined with the noise and wave sounds to suit the individual. Default settings are available in Compass™ GPS, based on careful studies of the quality of the tones and listeners' preferences, but they can also be individualized for each client in pitch, volume and tempo in Compass GPS (Figure 2).

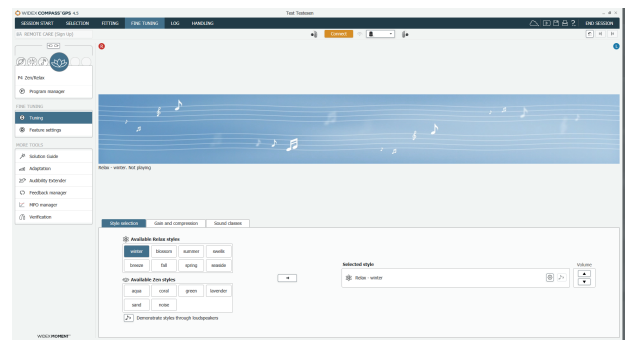


Figure 2: Screenshot of the tinnitus management options in Compass GPS.

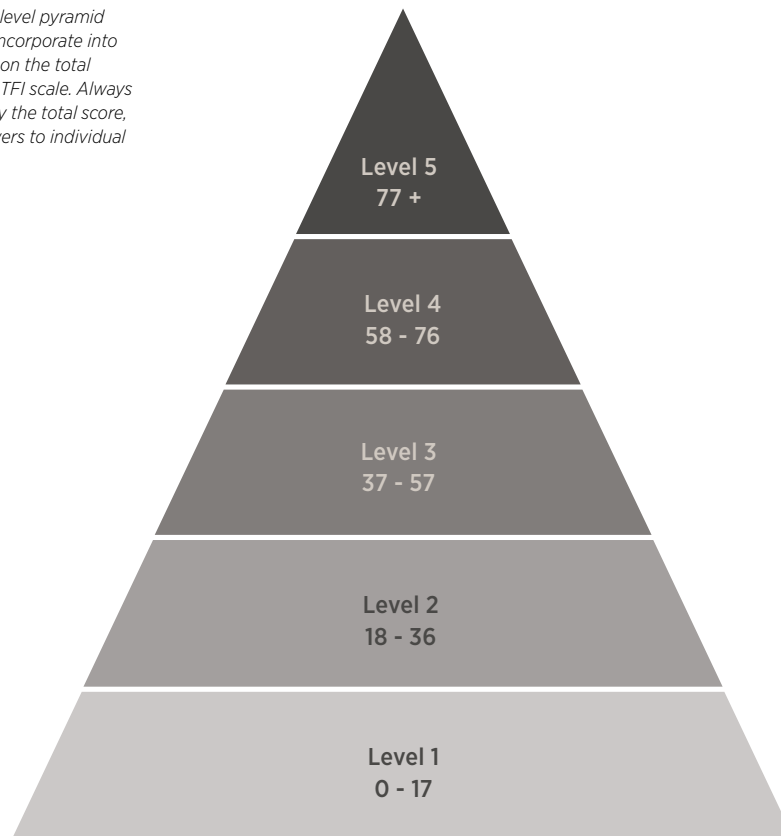
Both Zen and Widex SoundRelax are fractal sounds, based on the same principles of fractal mathematics. This ensures that there are no sudden changes in tonality or tempo, which in turn means that the sounds repeat enough to sound familiar and follow appropriate rules, but vary enough to not be predictable. This is important because the brain will typically eventually habituate to any predictable sound and the effect the stimuli have may then decrease. Fractal tones can be used regardless of the level of tinnitus distress.

## RELAXATION

Since tinnitus often causes stress for the client, and since stress often increases tinnitus perception, tools for enhancing relaxation can be very important. WZT includes relaxation exercises that the client can do at home. Furthermore, seeing as stress can be increased by lack of sleep, WZT also provides advice for establishing good sleeping patterns.

WZT is relevant for clients with a range of tinnitus distress levels and needs. The level of distress is established via a comprehensive intake questionnaire, subjective scale scores, and interviews with the client. A general guideline regarding how to individualize the approach using level of distress based on subjective scale measures is seen in Figure 3.

*Figure 3: Tinnitus disturbance level pyramid  
Guideline for components to incorporate into the individualized WZT based on the total subjective scale scores on the TFI scale. Always make sure to judge not only by the total score, but review the individual answers to individual questions and sub-scales.*



- Level 5: Catastrophic tinnitus reaction**  
Instructional and adjustment-based counseling. Cognitive behavioral intervention. Amplification (when hearing loss exists). Zen and SoundRelax tones (all day). Relaxation exercises (2 – 3 times per day).
- Level 4: Severe negative tinnitus reaction**  
Instructional and adjustment-based counseling. Cognitive behavioral intervention. Amplification (when hearing loss exists). Zen and SoundRelax tones (all day). Relaxation exercises.
- Level 3: Moderate negative tinnitus reaction**  
Instructional and adjustment-based counseling. Cognitive behavioral intervention. Amplification (when hearing loss exists). Zen and SoundRelax tones (all day). Relaxation exercises (optional).
- Level 2: Mild negative tinnitus reaction**  
Instructional and adjustment-based counseling. Amplification (when hearing loss exists). Zen and SoundRelax tones (quiet environments). Relaxation exercises (optional).
- Level 1: Minimal/no tinnitus reaction**  
Instructional counseling. Amplification (when hearing loss exists). Zen and SoundRelax tones (quiet environments).

## EVIDENCE

### EFFICACY OF ZEN FRACTAL TONES

Zen fractal tones were developed based on the evidence that certain types of music have a relaxing effect on the brain. In 2008, Widex launched the first hearing aid with a built-in fractal tone generator. Kuk et al. (2008) investigated the relaxing effect of the Widex Mind 440 hearing aid with Zen tones. Fourteen adults with mild to moderately severe hearing loss were fit with Mind 440 hearing aids. They were asked to rate their relaxation levels after listening to 4 Zen styles. Participants rated most Zen programs to be either very relaxing or somewhat relaxing.

The authors concluded that the Zen program had a significant relaxing effect and that the Zen tones could be used by adult hearing aid wearers as a way of achieving higher levels of relaxation.

Sweetow and Henderson-Sabes (2010) investigated the effect of amplification, Zen tones, and white noise on tinnitus annoyance, handicap, and relaxation in 14 adults with hearing loss. The participants' primary complaint was tinnitus. Prior to the investigation, each participant reported significant negative reaction to their tinnitus even after extensive counseling, and, in many cases, sound therapy. For the study, subjects were fit with Widex Mind 440 devices and were evaluated over a period of 6 months. The Tinnitus Handicap Index (THI) and Tinnitus Reaction Questionnaire (TRQ) were used to monitor progress. The mean reduction in THI and TRQ scores are seen in Figure 4. For both measures, the reduction in tinnitus handicap was significant at the 1- and 3-month visits. At the 6-month visit the results were consistent with the results from the 3-month visit, suggesting a robust and lasting effect. Furthermore, 13 out of 14 participants rated their tinnitus as less bothersome post-treatment. In addition, 86% of the participants indicated it was easier to relax while listening to the fractal tones.

A study by Kuk et al. (2010) reported similar results. Clinicians with experience in tinnitus treatment were asked to apply the treatment to participants with hearing loss and tinnitus and to measure the efficacy

pre- and post-treatment with the TRQ. The clinicians reported that 100% of the 49 participants indicated a reduction in tinnitus distress. The participants with the most severe tinnitus distress prior to treatment experienced the largest benefit.

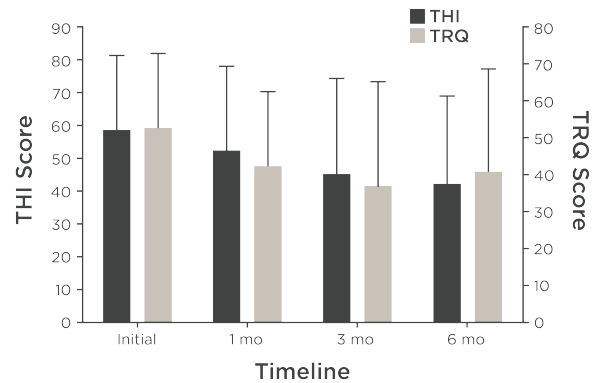


Figure 4. Mean THI and TRQ scores as a function of visit.

The authors concluded that Zen was a highly effective way of treating tinnitus distress, and that the option of having the Zen tones simultaneously with amplification was particularly beneficial, since it could lessen the tinnitus distress while also providing the clients with the ability to communicate better. They also reported that 2 out of 3 participants tried more than one Zen style, implying that multiple options are important.

Herzfeld et al. (2011) assessed the effectiveness of Zen tones on 48 adults with tinnitus, who indicated different levels of tinnitus distress. Results showed a clinically significant (>17 points) reduction on the TRQ scale (40-100% reduction) for 90% of participants. There was also a tendency towards greater reduction for participants suffering from more severe levels of distress. The 10% not experiencing a significant reduction in distress had a low degree of distress prior to treatment.

These studies confirmed the effectiveness of Zen tones and ultimately inspired Widex to include the Zen tones in a more holistic approach, the Widex Zen Therapy.

## WIDEX SOUNDRELAX FOR TINNITUS SUFFERERS AND OTHERS

As an evolution of the Zen fractal tones, the Widex SoundRelax styles have the same purpose of using sound therapy to provide relief from tinnitus, as part of Widex Zen Therapy. In addition, Widex SoundRelax is intended to support relaxation, concentration and well-being also for hearing aid users without tinnitus. Two studies were conducted in order to investigate the tones with respect to the two purposes.

Balling et al. (2022) asked 22 participants with and without tinnitus to listen to the new Widex SoundRelax styles in self-selected everyday situations. After listening to each sound, participants rated how well they liked that sound and how they would rate it with respect to key parameters like relaxation, concentration, and well-being. There was some variation in how well individual listeners liked individual sounds, but all listeners found a sound that they liked. Figure 5 shows mean ratings for each listener’s favourite sound, with very high ratings across all parameters. The highest and most systematic ratings are seen for relaxation.

Participants’ high ratings in the study indicate great potential for Widex SoundRelax styles chosen by the individual user to support relaxation, concentration, and well-being.

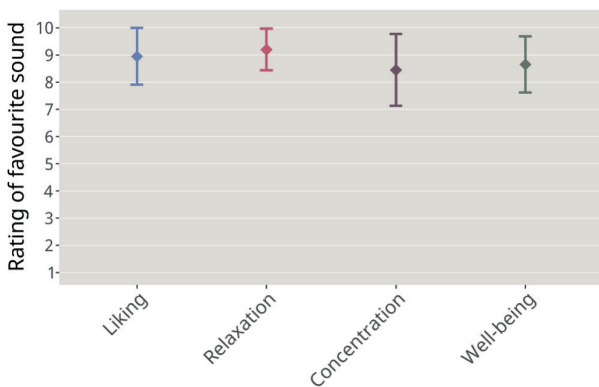


Figure 5: Mean ratings of participants’ favorite sound with respect to liking, relaxation, concentration, and well-being. Diamonds show mean ratings with the whiskers indicating +/- 1 standard deviation.

While Balling et al. (2022) included users with and without tinnitus, Balling et al. (2023) focused on users with bothersome tinnitus, who took part in a 12-month study to investigate the efficacy of the Widex SoundRelax tones for tinnitus treatment. Twenty users wore Widex Moment 440 hearing aids and used their preferred Widex SoundRelax styles in everyday life. The participants answered questionnaires about their tinnitus handicap at regular intervals. Balling et al. (2023) reported the results from the first 4 months of the study, showing significant improvement in Tinnitus Handicap Inventory (THI, Newman et al., 1996) and the Tinnitus Functional Index (TFI, Meikle et al., 2012) already after one month with continued improvement after that as illustrated in Figure 6.

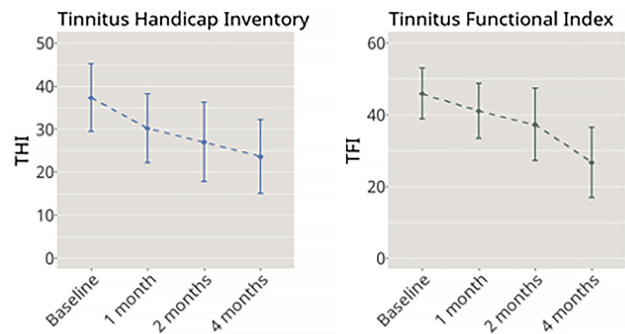


Figure 6: Ratings of Tinnitus Handicap Inventory (left) and Tinnitus Functional Index (right) at baseline and after one, two and four months of amplification and sound stimulation. Lower scores indicate reduced tinnitus burden. The diamonds show mean ratings with the whiskers indicating +/- 1 standard deviation.

The authors conclude that sound stimulation with Widex SoundRelax reduces tinnitus handicap. The study shows similar results to previous studies on the effects of Zen tones. Both types of tones may be chosen, depending on the individual’s preference, as parts of Widex Zen Therapy.

EVIDENCE SUPPORTING THE USE OF WIDEX ZEN THERAPY

Based on the success of the fractal tone and amplification studies, and the growing body of research indicating the importance of both informational and adjustment-based counseling, Widex introduced the integrated tinnitus program, Widex Zen Therapy (WZT), in 2012. The following investigations report on the efficacy of WZT.

Herzfeld et al. (2014) studied the effects of WZT on 24 adults with hearing loss and tinnitus over a period of 6 months. The Tinnitus Functional Index (TFI) and Tinnitus Handicap Inventory (THI) were measured at baseline and repeated 2 and 6 months later. The devices used in this study were the Widex DREAM products of different performance levels, depending on the needs and economical resources of the participants. Results 2 months post-baseline measurement yielded a highly significant mean improvement on the TFI score of 28 points. The TFI scores continued to drop between 2 and 6 months, indicating a further improvement for the participants, though the difference was not statistically significant. The results thus suggested that the reduction of tinnitus distress was maintained at 6 months post-baseline measurement. These results are depicted in Figure 7. Similar results were found for the THI.

The importance of these data is that not only do the improvements persist for at least six months, but that, unlike many other tinnitus treatments which take longer to show effects, subjects receiving WZT appear to achieve beneficial results as early as 2 months (and many almost immediately after fitting).

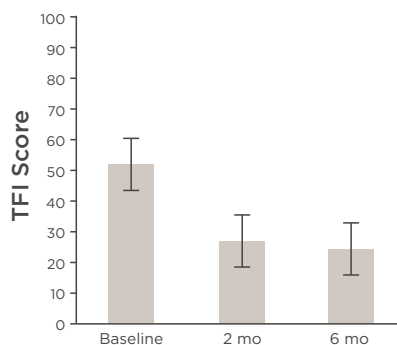


Figure 7. TFI scores from the study by Herzfeld et al. (2014).

The effectiveness of WZT for longer time periods has also been confirmed. Sweetow, FehI, and Ramos (2015) conducted a study of the benefits of WZT on 19 participants (18 of which were first-time hearing aid users) over a 12-month period. TFI and THI scales were measured at baseline and at 2, 4, 6, 9 and 12 months post-baseline (Figure 8). Participants were fit with Widex CLEAR or Widex DREAM hearing aids, depending on their individual needs. All participants received initial brief counseling and relaxation exercises. Additional CBI counseling was provided if the clinician deemed it appropriate.

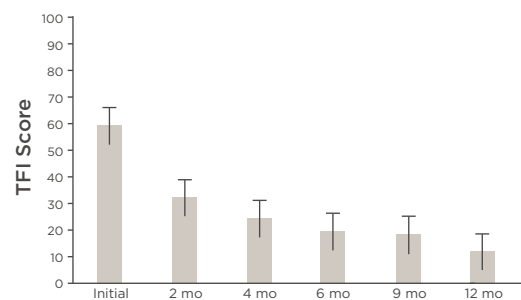


Figure 8. Mean Tinnitus Functional Index Scores at Baseline, 2, 4, 6, 9 and 12 months.

Results showed a progressive reduction in TFI score. The greatest reduction was seen between baseline and 2 months with average reductions in TFI of 32 points. Reductions in TFI between other measurement times were not statistically significant. Once again, it was found that the greatest degree of improvement occurred quickly, within the first two months of treatment. Moreover, the benefits persisted at least out to 12 months, where it was found that the average final TFI score was 11.76, a clinically insignificant level of tinnitus distress. Of further interest was the fact that the relative use of the Zen programs containing noise decreased over time while the use of amplification alone and/or amplification plus fractal tones increased even after a successful resolution of the tinnitus distress had been achieved.

The authors concluded that “the inverse relationship between the use of Zen programs versus amplification alone over time suggests that patients perceive a continued benefit for using amplification for improving their hearing, and possibly for tinnitus relief, even post habituation or successful resolution. This despite the fact that all subjects reported tinnitus, rather than hearing loss, as their primary complaint.”



The aforementioned studies investigated the benefit of WZT for individuals with hearing loss and tinnitus. However, tinnitus sufferers with a minimal need for amplification can also benefit from the WZT approach. Sweetow, Kuk, and Caporali (2015) studied 41 participants, most of whom had normal hearing thresholds below 2kHz. None of the participants expressed a need for amplification. Participants were divided into matched treatment and waiting (control) groups (the control group receiving only an initial evaluation and brief instructional counseling on the nature of tinnitus and hearing). Participants in the treatment group were fitted with Zen2Go (non-amplifying) devices with fractal tones.

In the next phase of treatment, participants that had not met the criterion of a significant reduction in tinnitus distress had additional components of WZT added, such as amplification, Cognitive Behavioral Intervention (CBI) and relaxation exercises. Progress was monitored at 2, 4, 6 and 12 months post-baseline measurement (Figure 9).

Results showed minimal changes for the control group, but highly significant improvements (consistent with past studies) on the TFI for the group receiving WZT.

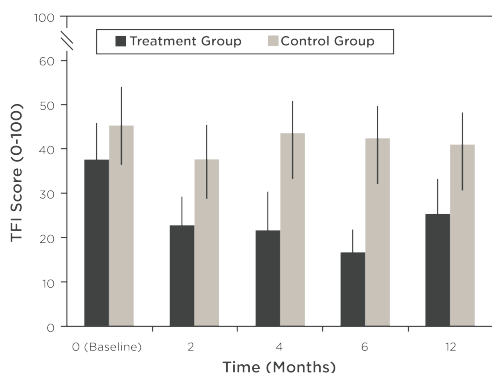


Figure 9. Mean TFI scores at baseline, 2, 4 and 6 months for the 2 treatment sub-groups.

It is also relevant to investigate the separate contribution of the different WZT components. Johansen et al. (2014) investigated the effectiveness of components of tinnitus treatment (specifically counseling, amplification, and Zen tones) applied sequentially for 35 participants with initial THI scores greater than 20 and mild-severe hearing loss. Eighty percent of the participants were first-time hearing aid users. Initially, they were all given instructional

counseling. Two months after the counseling, the participants were fit with Widex CLEAR 440 hearing aids. Two months post-fitting, the Zen tones were added in a second program, which the participants could manually switch from their universal program. A final session of counseling was applied two months after the activation of Zen. The THI score was measured at each appointment. As shown in Figure 10 there was a reduction in the mean THI score following each additional tinnitus treatment component.

Data showed that 85.7% of participants had a reduction of tinnitus distress at the end of the study when all components had been applied, indicating a cumulative effect of the different elements.

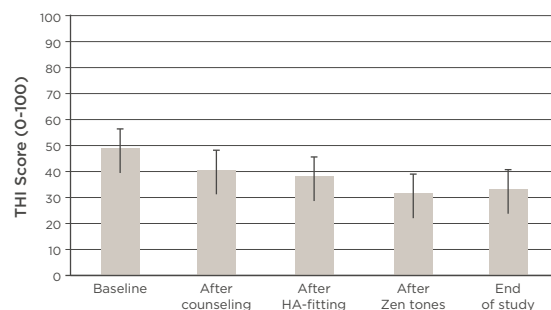


Figure 10. Mean values for THI at baseline, post-counseling, post-amplification and post-Zen.

Another point of interest in the study was to investigate how the participants perceived the benefit of the fractal tones. These results showed that 70% of the participants reported a good/very good effect on relaxation with the Zen tones. Also, 50% of the participants reported that the Zen tones had a good/very good effect in reducing stress. Lastly, 63% of the participants reported that the Zen tones had a good/very good effect in reducing tinnitus awareness and 52% experienced that Zen helped reducing tinnitus annoyance.

Consistent with previous studies, there was a tendency for participants with more severe tinnitus to benefit more from the treatment than those with a milder tinnitus distress level. It seems that combination of components applied individually initially in the tinnitus treatment can promote significant reduction of tinnitus distress in a shorter time (Herzfeld et al, 2014; Sweetow, Fehl, & Ramos, 2015; Sweetow, Kuk, & Caporali, 2015)

Stocking et al. (2016) also investigated the individual components of WZT. Twenty participants with TFI scores greater than 38 were studied. Participants were fit with Widex CLEAR 440 Fusion hearing aids and were seen 8 times over a period of 12 months. For subjects with no or minimal hearing loss, the hearing aid was set with minimal or no amplification. The four components of WZT were applied sequentially at two-week intervals. Extensive counseling was only done if the client needed it. Bi-weekly outcome measures were collected using with TFI. Seventeen participants completed the study. The mean improvement in TFI score was a statistically and clinically significant 28 points.

An end-of-study-questionnaire was completed (Figure 11). Participants were asked if they felt the different components had helped them. All participants felt informational counseling was of benefit, 73% rated the hearing aids as “great”, 67% rated the Zen tones as “great” and 73% of subjects felt the follow-up was of great benefit.

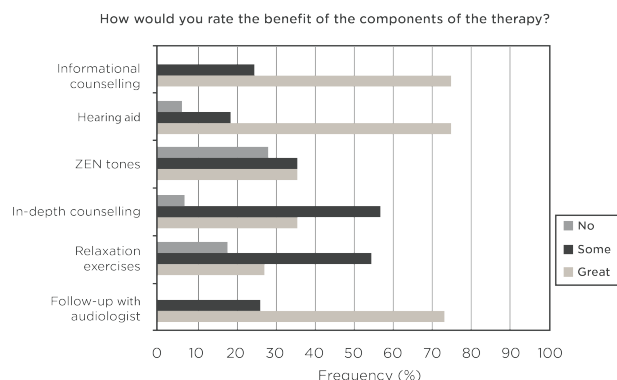


Figure 11. Perceived benefit for each component of WZT by subjects.

This study again indicated that the WZT approach can successfully be used in the management of tinnitus. The authors concluded that the strength of WZT may be due to a cumulative effect of the components.

## CONCLUSION

Widex Zen Therapy and the use of fractal tones as sound therapy have a long and successful history on the market, with very extensive research showing the benefits of the fractal sounds in themselves and as part of the multi-faceted framework of WZT. Widex SoundRelax builds on this heritage while improving the sound quality and selection of sounds and also extending the benefits to hearing aid users who do not suffer from tinnitus. Together, the four elements of Widex Zen Therapy – counseling, amplification, fractal tones and relaxation – offer an evidence-based foundation for clinicians to work with their clients to alleviate tinnitus and offer a sound like no other.

## REFERENCES

Balling, L. W., Caporali, S., Parker, D., Jeppesen, A. M., & Helmink, D. (2022). Are hearing aids the answer to reducing stress and improving well-being? *Hearing Review*, 29(8), 24–27.

Balling, L. W., Caporali, S., Parker, D., Jeppesen, A. M., & Helmink, D. (2023). Expanding options for effective tinnitus management. *Hearing Review*, 30(2), 12–16.

Cima, R. F., Andersson, G., Schmidt, C. J., & Henry, J. A. (2014). Cognitive-behavioral treatments for tinnitus: A review of the literature. *Journal of the American Academy of Audiology*, 25(1), 29–61. <https://doi.org/10.3766/jaaa.25.1.4>

Herzfeld, M., Enza, C., & Sweetow, R. (2014). Clinical trial on the effectiveness of Widex Zen Therapy for tinnitus. *Hearing Review*, 21(11), 24–29.

Herzfeld, M., & Kuk, F. A. (2011). A clinician’s experience with using fractal music for tinnitus management. *Hearing Review*, 18(11), 50–55.

Hyung, J. J., & Moo, K. P. (2013). Cognitive behavioral therapy for tinnitus: Evidence and efficacy. *Korean Journal of Audiology*, 17(3), 101–104. <https://doi.org/10.7874/kja.2013.17.3.101>

Jastreboff, P. J. (2000). Tinnitus habituation therapy (THT) and tinnitus retraining therapy (TRT). In R. Tyler (Ed.), *Tinnitus Handbook* (pp. 357–376). Cengage Learning.



- Jarach, C.M., Lugo, A., Scala, M., van den Brandt, P.A., Cederroth, C.R., Odone, A., Garavello, W., Schlee, W., Langguth, B., & Gallus, S. (2022). Global prevalence and incidence of tinnitus: A systematic review and meta-analysis. *JAMA Neurology*, 79(9), 888-900. <https://doi.org/10.1001/jamaneurol.2022.2189>
- Johansen, J. D., Skellgaard, P. H., & Caporali, S. (2014). Effects of counseling, amplification and fractal tones in tinnitus management. *Journal of Communication Disorders, Deaf Studies and Hearing Aids*, 2(4). <https://doi.org/10.4172/2375-4427.1000124>
- Kikidis, D., Vassou, E., Markatos, N., Schlee, W., & Iliadou, E. (2021). Hearing aid fitting in tinnitus: A scoping review of methodological aspects and effect on tinnitus distress and perception. *Journal of Clinical Medicine*, 10, 2896. <https://doi.org/10.3390/jcm10132896>
- Kochkin, S., & Tyler, R. (2008). Tinnitus treatment and the effectiveness of hearing aids: Hearing care professional perceptions. *Hearing Review*, 15(13), 14-18.
- Kuk, F., Peeters, H., & Lau, C. L. (2010). The efficacy of fractal music employed in hearing aids for tinnitus management. *Hearing Review*, 17(10), 32-42.
- Kuk, F., & Peeters, H. (2008). The hearing aid as a music synthesizer. *Hearing Review*, 15(11), 28-38.
- Martinez-Devesa, P., Perera, R., Theodoulou, M., & Waddell, A. (2010). Cognitive behavioural therapy for tinnitus. *Cochrane Database of Systematic Reviews*, 8(9), CD005233. <https://doi.org/10.1002/14651858.CD005233.pub3>
- Meikle, M. B., Henry, J. A., Griest, S. E., Stewart, B. J., Abrams, H. B., McArdle, R., Myers, P. J., Newman, C. W., Sandridge, S., Turk, D. C., Folmer, R. L., Frederick, E. J., House, J. W., Jacobson, G. P., Kinney, S. E., Martin, W. H., Nagler, S. M., Reich, G. E., Searchfield, G., Sweetow, R., & Vernon, J. A. (2012). The tinnitus functional index: development of a new clinical measure for chronic, intrusive tinnitus. *Ear and Hearing*, 33(2), 153-176. <https://doi.org/10.1097/AUD.0b013e31822f67c0>
- Newman, C. W., Sandridge, S. A., & Jacobsen, G. P. (1998). Psychometric adequacy of the Tinnitus Handicap Inventory (THI) for evaluating treatment outcome. *Journal of American Audiology*, 9(2), 153-60.
- Ramsgaard J., Korhonen, P., Brown, T. K., & Kuk, F. (2016). Wireless streaming: Sound quality comparison among MFi hearing aids. *Hearing Review*, 23(12), 36.
- Searchfield, G.D., Kaur, M., & Martin, W.H. (2010). Hearing aids as an adjunct to counseling: Tinnitus patients who choose amplification do better than those that don't. *International Journal of Audiology*, 49(8), 574-579. <https://doi.org/10.3109/14992021003777267>
- Stocking, C. T., & Stecker, N. A. (2016, December). *Efficacy of the individual components of a tinnitus management protocol*. AudiologyOnline. <https://www.audiologyonline.com/articles/efficacy-individual-components-tinnitus-management-18326>
- Sweetow, R. W., FehI, M., & Ramos, P. M. (2015). Do tinnitus patients continue to use amplification and sound therapy post habilitation? *Hearing Review*, 21(3), 34.
- Sweetow, R., Kuk, F., & Caporali, S. (2015). A controlled study on the effectiveness of fractal tones on subjects with minimal need for amplification. *Hearing Review*, 22(9), 30.
- Sweetow, R. W., & Sabes, J. H. (2010). Effects of acoustical stimuli delivered through hearing aids on tinnitus. *Journal of American Academy of Audiology*, 21(7), 461-473. <https://doi.org/10.3766/jaaa.21.7.5>
- Trotter, M. I., & Donaldson, I. (2008). Hearing aids and tinnitus therapy: A 25-year experience. *The Journal of Laryngology & Otology*, 122(10), 1052-1056. <https://doi.org/10.1017/S002221510800203X>
- Tunkel, D. E., Bauer, C. A., Sun, G. H., Rosenfeld, R. M., Chandrasekhar, S. S., Cunningham Jr, E. R., Archer, S. M., Blakley, B. W., Carter, J. M., Granieri, E. C., Henry, J. A., Hollingsworth, D., Khan, F. A., Mitchell, S., Monfared, A., Newman, C. W., Omole, F. S., Phillips, C. D., Robinson, S. K., Taw, M. B., ... Whamond, E. J. (2014). Clinical practice guideline: Tinnitus. *Otolaryngology - Head and Neck Surgery*, 151(2 Suppl), S1-40. <https://doi.org/10.1177/0194599814545325>
- Tyler, R. S. (2000). *Tinnitus handbook*. Cengage Learning.
- U.S. Department of Veterans Affairs. (2021, Aug 30). *VA Research on hearing loss*. <https://www.research.va.gov/topics/hearing.cfm#research4>