# Goal Attainment Scale in tinnitus (GAS-T) : treatment goal priorities by chronic tinnitus patients in a real-world setting

# GOAL ATTAINMENT SCALE IN TINNITUS (GAS-T): TREATMENT GOAL PRIORITIES BY CHRONIC TINNITUS PATIENTS IN A REAL-WORLD SETTING.

(Abbreviated title: **Goal Attainment Scale in Tinnitus (GAS-T)**)

Corresponding author: Wagenaar, Olav; Rijndam Rehabilitation Center, Westersingel 300, 3015 LJ Rotterdam, The Netherlands. Phone: 0031-10-2412412, Fax: 0031-10-2412434, email: Owagenaar@rijndam.nl
ORCID: 0000-0002-5684-3811

AUTHORS AND AFFILIATIONS:

Wagenaar, Olav; Department of neurology, Rijndam Rehabilitation Center, Rotterdam, The Netherlands.

Gilles, Annick; PhD; Department of Otorhinolaryngology, Antwerp University Hospital, Antwerp, Belgium; Department of Translational Neurosciences, Faculty of Medicine and Health Sciences, University of Antwerp, Antwerp, Belgium.

Van Rompaey, Vincent; MD, PhD; Department of Otorhinolaryngology and Head & Neck Surgery, Antwerp University Hospital, Edegem, Belgium; Department of Translational Neurosciences, Faculty of Medicine and Health Sciences, University of Antwerp, Antwerp, Belgium.

Blom, Henk.; MD, PhD; Otorhinolaryngology, Haga Teaching Hospital, The Hague, The Netherlands; Department of Otorhinolaryngology, Antwerp University Hospital, Antwerp, Belgium

ABSTRACT

**Purpose:** Standard treatment for tinnitus is cognitive behavioral therapy, although level of evidence of effectiveness is low. There is need for a goal attainment scale to evaluate treatment effects based on patient satisfaction. Preliminary work in a clinical sample has identified six common personal treatment goals. Purpose of this study is to determine whether the preliminary identified goals are confirmed by a heterogeneous sample of people with bothersome tinnitus and to identify any other common personal goals with the intention to construct a closed-end Goal Attainment Scale for tinnitus for use in research of effectiveness of (new) tinnitus treatments.

**Methods:** Two consecutive polls were plotted in an online peer support group form a heterogeneous sample. First, members were asked to vote for preliminary identified goals and asked to formulate additional personal goals. Corresponding goals were grouped together. Goals that were acknowledged by at least 10% of respondents were used in the second poll in which respondents could vote for statements they recognized themselves in.

**Results:** The first poll (N=180) resulted in 15 personal treatment goals. Comparison resulted in 5 common goals, which were confirmed in the second poll (N=238): to gain control, to improve well-being and sleep, to reduce effects on hearing and to understand tinnitus.

**Conclusion:** We expect that if a patient achieves personal goals, he will be likely to reduce healthcare consumption. Based on common goals, validity of treatment evaluations is increased. We present a closed-end Goal Attainment Scale in tinnitus.

KEYWORDS
Tinnitus, Patient satisfaction, Treatment, Evaluation, Effectiveness, Scale

STATEMENTS and DECLARATIONS
The authors disclose no competing interest.
This study has not been funded.

Ethical Approval:
This study was not subject to the Medical Research Involving Human Subjects Act (WMO) and therefore didn't need to undergo a review by an accredited Medical Ethics Review Committee (METC). The research involves human participants, and all procedures performed in the study involving human participants were in accordance with the 1964 Declaration of Helsinki and its later amendments or comparable ethical standards (*JAMA* 2000;284:3043–3049). The handling of personal data conformed with the Medical Treatment Agreement Act (WBGO) although a formal treatment relation did not occur. We also complied with the Dutch Act on Implementation of the General Data Protection Regulation (AVG).

Informed Consent:
All patients were provided with written information concerning the study and were informed to provide consent before their participation in the study by voluntary filling out the online questionnaire.

# GOAL ATTAINMENT SCALE IN TINNITUS (GAS-T): TREATMENT GOAL PRIORITIES BY CHRONIC TINNITUS PATIENTS IN A REAL-WORLD SETTING.

## INTRODUCTION

Tinnitus is the perception of a sound without a corresponding external source [1,2]. Epidemiological studies show that (severe) tinnitus is common with estimation of overall prevalence to fall in the range of 10 to 20% [3]. There is, however, variability in prevalence estimates due to widespread inconsistency in defining and reporting tinnitus in studies [2]. In a recent cross-sectional study using data of a Dutch (general) population-based cohort of 124,490 respondents, 25.4% reported to hear tinnitus sometimes and 6.4% always [4]. In 1-3% of the population with chronic tinnitus, it causes severe problems in daily life functioning [4-6]. Furthermore, personality factors, individual motivation and expectations for treatment are significant components of treatment seeking behavior [4-7], which in the last few years has led to the understanding and growing scientific interest in the heterogeneity of the population of people seeking help for bothersome tinnitus [8]. Because of the heterogeneity of the population, it was proposed in 2021 to define tinnitus as the conscious awareness of a tonal or composite noise for which there is no identifiable corresponding external acoustic source, which becomes Chronic Tinnitus Disorder when it becomes associated with emotional distress, cognitive dysfunction, and/or autonomic arousal, leading to behavioral changes and functional disabilities [9].

Curative treatment is lacking. Standard treatment for chronic tinnitus disorder is cognitive behavioral therapy (CBT) individually or in a group with sometimes added expert psychotherapeutic interventions [10-12]. CBT may be effective in reducing tinnitus' negative impact on quality of life compared with doing nothing, but the evidence is of low certainty and long- term persistence of the effects is unknown [13]. To evaluate the efficacy of treatment, European guideline recommends the use of validated questionnaires such as Tinnitus Handicap Inventory, Tinnitus Handicap Questionnaire or Tinnitus Functional Index (et cetera) [14].

While these instruments have proven to be scientifically valuable and valid [15-18], these outcome measures measure changes in psychological or functional constructs, which are interpreted as indicators of a change in well-being, leading to the assumption that the patient will be satisfied with the outcome of treatment, based on measured positive change. However, although these instruments are equally subjective as is satisfaction, they do not measure the same construct as patient satisfaction. It is therefore possible that the patient may feel subjectively unhelped due to unknown personal expectations or wishes, despite improved scores on the hybrid instruments. From a patient and societal perspective, the question then arises whether the therapy has really been

effective, for in the case of discrepancy between outcome measures and a priori personal expectation it is likely that patients will continue their health care consumption. This may explain the seemingly growing demand for treatment, while the prevalence has been relatively stable for decades [19]. To counteract the possible blind spot for subjective patient satisfaction, there is a need to develop a personalized goal attainment scale to be used aside the validated questionnaires.

Goal Attainment Scaling is an individualized evaluation method. Scoring is done on an ordinal 5-point scale, with which a person's individual treatment goal is recorded and afterwards scored on the achievement of that treatment goal. In addition, the reporting points provide insight into the extent to which a goal is or is not (or is partially) achieved. Kiresuk and Sherman [20] have developed a transformation of GAS score results that leads to a sum score (a standardized T-score) per individual GAS, which weighs the correlation between different goals and the importance of the different goals. A T-score indicates more clearly at what level someone performs in terms of achieving their goals. A T-score is a standardized score which is not biased: scores above 50 indicate goals achieved, below 50 goals not achieved.

Preliminary work has been done by Searchfield [21], who modified the Client-Oriented Scale of Improvement (COSI) [22] which is an open-end tool developed to help clinicians plan rehabilitation based on patient's communicated priorities for treatment goals, into the COSIT (Client-Oriented Scale of Improvement in Tinnitus). The COSIT is also an open-end questionnaire. Open-end questionnaires improve the subjective recognition by patients and goal planning, but do not allow interpretation of group effects of treatment [23]. Furthermore, as open-ended questionnaires have face validity in understanding an individual's problem, they have not in understanding problems from a population sample. Also, they are relatively time consuming. Using the open-end questionnaire COSIT, six personal but common tinnitus treatment goals were identified by Searchfield in a retrospective evaluation of four different clinical data samples from a total of 122 patients [24]. When common personal goals of treatment can be identified, it gives rise to the possibility to create a closed-end Goal Attainment Scale (GAS) which can be used in research to assess patiënt treatment satisfaction. In the present study, we want to determine whether the preliminary goals identified by Searchfield [24] are confirmed by a heterogeneous sample of people with bothersome tinnitus. We also want to identify any other common personal goals. We do this with the intention to construct *a closed-end* Goal Attainment Scale in tinnitus for use in research of efficacy of (new) tinnitus treatments.

## METHODS

### Participants

Participants were voluntary members of a peer support group for people with tinnitus on Facebook. The private online group is aimed at people who have tinnitus and have committed themselves to a series of group rules of conduct, which is monitored by six moderators annex tinnitus specialists (1 hearing care professional, 1 audiologist, 1 neuropsychologist, 1 psychological hearing coach, 2 experience experts). Random people can apply for membership and participation where they must answer three questions: “your membership is only granted after having answered the following questions and if you commit yourself to the rules of conduct that apply to participation in this group, of which you find a link at the bottom of this page. Do you have bothersome tinnitus with or without hyperacusis?” (answering options are ‘yes’ or ‘no’), “is your age 18 years or higher?” (answering options are ‘yes’ or ‘no’) and “do you agree with the rules of the administrator?” (answering options are ‘yes’ and ‘no’. It is also possible to not answering this question). Only when de applicant answers “yes” to all three questions, the applicant will be admitted by the moderators. Admitted members can then chat with each other, ask questions, but also share experiences or share tips and tricks or specific tinnitus related knowledge. Admitted members can also watch educational animations about tinnitus or follow specific chat topics. At date the total amount of members is about 5300 people, with a relatively large amount of passive ‘readers’. The moderators can contact each other at any time for consultation, coordination or joint decision-making via the Facebook Messenger, a service for instant messaging which is linked to Facebook. This concerns admission, but also any interventions (removal, correction, or nuance of content etc.) when a member does not comply with the group rules (for example in the case of disrespectful posts, layman advice on medication or drugs, or excessive negativity that appears to meet group resistance).

Although the group is primarily intended for people who are new to tinnitus, have questions and seek directions, in fact people also stay longer in the group to get support when needed and to help others in their difficult initial period with tinnitus.

### Data collection

In this Facebook peer support group, two consecutive polls have been posted. In the first poll members of the online group were asked about their personal goals for tinnitus treatment in the following way: first the goals that emerged from American research [24] were explained. The explanation included that responding meant informed consent. Second, these goals were presented to them, and respondents were asked to vote for any goal

they recognized as their own personal treatment goal. Third, they were asked to formulate their additional personal goals for tinnitus treatment if they had any. Those additional goals could also be voted for by following respondents if they recognized themselves in them. The poll stayed open for a week extra after the last added goal to give it the chance of getting voted on sufficiently. All personal goals that had been put forward in this way were then compared in terms of content; all goals with the same meaning were grouped together. Then, following the previous study [24], all goals in which at least 10% of all respondents identified themselves were used in the second poll.

The second poll was preceded by an extensive explanation of the reason for the poll, the underlying intentions and again the statement that responding also meant informed consent. It was emphasized that participation would be strictly voluntary without negative consequences for their membership in the peer support group in case of non-response. Furthermore, it was emphasized that data would be processed anonymously and that the elaborated data would be offered for scientific publication.

In the second poll, as state above, goals in which 10% or more of all respondents of the first poll identified themselves were presented, along with the following additional statements that could be voted on if the respondent agreed with the statement. If the respondent disagreed with the statement, the instruction was not to vote for it.

- "I have also responded to the first poll in this FB group concerning this topic".
- "I respond for the first time to a poll in this FB group concerning this topic".
- "Apart from tinnitus, I also have a significant hearing loss that has been demonstrated by a hearing test".
- "I have tinnitus, but no significant hearing loss has been demonstrated".
- "I am a man / I have a male identity".
- "I am a woman / I have a female identity".
- "My age is between 18 and 28".
- "My age is between 29 and 39".
- "My age is between 40 and 50".
- "My age is between 51 and 61".
- "My age is between 62 and 72".
- "My age is 73 years or older".

- "In addition of being a member of this peer support group, I am also being treated for dealing with tinnitus by a regular care provider (mental health care center, audiological center, et cetera)"

Not every statement was voted on by every respondent. Although a summation of the responses to the statements about gender should indicate the total amount of participants (N=238), the 2 statements about hearing loss were voted on by only 192 respondents. Presumably the missing part of the respondents don't know whether they have a hearing loss or not. The percentages which are calculated on that topic are based on the 192 responses. The statement about being treated for dealing with tinnitus by a regular care provider was added to the poll in a later stadium (after the 172nd respondent); the calculated percentage of the patient part of the current sample is therefore based on a smaller number of respondents (N=66).

RESULTS

**Poll 1**

In the first inventory poll 180 members responded. They voted for the six identified treatment goals by Searchfield [24] upon recognition as a personal treatment goal and formulated nine additional personal goals. This procedure resulted in votes for 15 personal goals for tinnitus treatment (Table 1 and Supplementary Digital Content I). Comparison of the 15 goals was based on the meaning of the goal formulations. Goal no. 11 "to reduce my anxiety and panic and feel more relaxed" and goal no. 14 "to improve quality of life", was interpreted as being consistent in terms of content with the goal of improved wellbeing (goal No.2). Goal no.10 "to know what I can do myself to accept tinnitus and integrate it into daily life", was interpreted as being consistent in terms of content with the goal "to better manage tinnitus by gaining control over tinnitus" (No.4). Goal no.7 "to know what outside influences are having an effect on my tinnitus specifically and learn what I can do about it personally" was interpreted as being consistent in terms of content with the goal no.3 "to be able to manage the influence of the context on my tinnitus' (Supplementary Digital Content II). This resulted in five common personal goals that at least 10% of the respondents identified with: gain control over tinnitus (32.7%), improve emotional well-being (21.8%), reduce the negative effect of tinnitus on hearing (12.6%), control over the influence of context on tinnitus (10.7%) and improvement of sleep (10.5%). Note that these are 5 out of 6 of the common personal goals already identified by Searchfield [24]. We therefore decided to present them also with the sixth common personal goal of Searchfield in the second poll.

**Table 1 Number of votes and percentage for preliminary identified common personal treatment goals (Searchfield, 2019) and additional personal goals from current poll no.1 (N=180).**

| | Goal | Votes | Votes (%) |
|---|---|---|---|
| 1[a] | “Important goal for therapy for me is to reduce the negative effect of tinnitus on hearing” | 68 | 12.6 |
| 2[a] | "Important goal for therapy for me is to improve my well-being and feel less depressed" | 90 | 16.6 |
| 3[a] | 'Important goal for therapy for me is to be able to manage the influence of the context on my tinnitus' | 32 | 5.9 |
| 4[a] | “Important goal for therapy for me is to better manage tinnitus by gaining control over tinnitus” | 108 | 20.0 |
| 5[a] | "Important goal for therapy for me is to improve my sleep" | 57 | 10.5 |
| 6[a] | "Important goal for therapy for me is to better understand my tinnitus" | 29 | 5.4 |
| 7 | 'Important goal for therapy for me is to know what outside influences are having an effect on my tinnitus specifically and learn what I can do about it personally' | 26 | 4.8 |
| 8 | 'Important goal for therapy for me is to find a more targeted hearing device that helps control tinnitus better' | 26 | 4.8 |
| 9 | “Important goal for therapy for me is to receive good literature, science, possibilities that might work” | 14 | 2.6 |
| 10 | 'Important goal for therapy for me is to know what I can do myself to accept tinnitus and integrate it into daily life' | 43 | 7.9 |
| 11 | “Important goal for therapy for me is to reduce my anxiety and panic and feel more relaxed” | 27 | 5.0 |
| 12 | 'Important goal for therapy for me is to be less distracted by tinnitus' | 14 | 2.6 |
| 13 | “Important goal for therapy for me is to rule out tinnitus being caused by a physical condition other than hearing loss” | 5 | 0.9 |
| 14 | "Important goal for therapy for me is to improve quality of life" | 1 | 0.2 |
| 15 | “Important goal for therapy for me is contact with fellow sufferers” | 1 | 0.2 |
| | Total: | 541 | 100.0 |

[a] *Preselected goals based on identification by Searchfield, 2019*

**Poll 2**

In the second research poll 238 members (79 men, 159 women) responded, with a mean age of 54 years old. See figure 1, 2a, 2b and 2c for demographic features. 31.8% of the respondents indicated that they were also being treated by a regular health care provider for their tinnitus complaint. They can be seen as a patient-part of the

sample, whereas the rest of respondents can be seen as a sample part of people with chronic tinnitus from the general population.

The six presented common personal goals (Table 1, first six goals) received 603 votes. As in poll 1, personal goal of gaining control over tinnitus received the most support, followed by personal goal of improving emotional well-being. Personal goal "to be able to manage the influence of the context on my tinnitus", which was qualified as common based on more than 10% of the votes of recognition in poll 1 of this study and in the study of Searchfield [24], only received 7.3% of the votes in poll 2. Percentages are shown in table 2.

**Fig. 1 Age distribution (% in light grey) of respondents in poll 2**

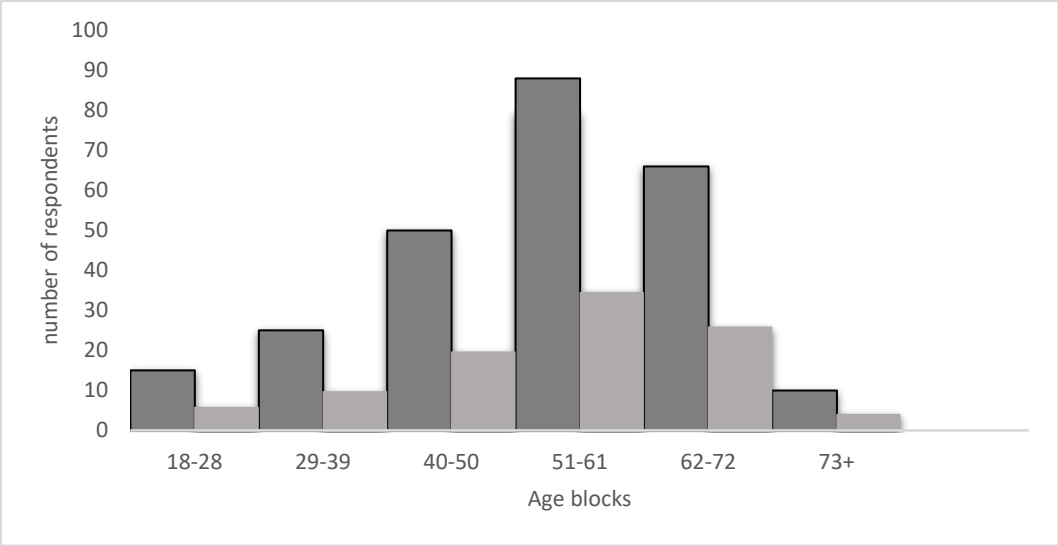


**Fig. 2a Distribution of Gender**

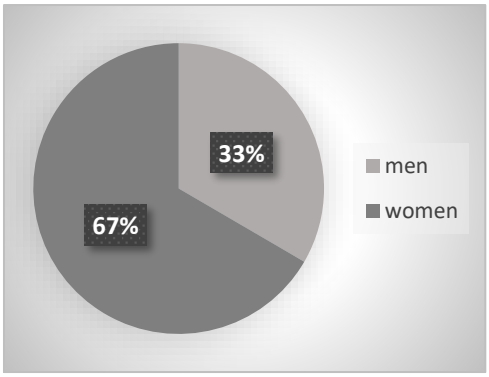

**Fig. 2b Distribution of Hearing**

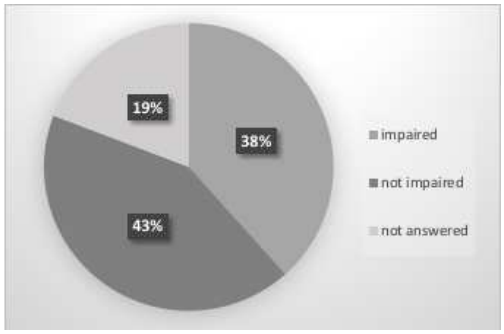


**Fig. 2c Distribution of respondents in poll 2 who also participated in poll 1**

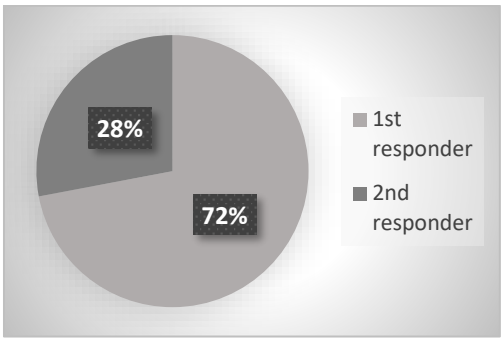


**Table 2 Preliminary common personal goals presented in the second poll in FB peer support group to vote for.**

| No. | Preliminary Common Personal goal | Votes | Votes (%) |
|---|---|---|---|
| 1[b] | Important goal for therapy for me is to reduce the negative effect of tinnitus on hearing | 86 | **14.3[d]** |
| 2[b] | An important goal for therapy for me is to improve my well-being and feel less depressed or anxious | 121 | **20.1[d]** |
| 3[b] | Important goal for therapy for me is to be able to manage the influence of the context on my tinnitus | 44 | 7.3 |
| 4[b] | An important goal for therapy for me is to be able to cope better with tinnitus by gaining control over tinnitus | 201 | **33.3[d]** |
| 5[b] | Important goal for therapy for me is to improve my sleep | 91 | **15.1[d]** |
| 6[c] | Important goal for therapy for me is to better understand my tinnitus | 60 | **10.0[d]** |

[b] Common personal goal identified by Searchfield as well as in Poll 1.
[c] Common personal goal identified by Searchfield but not identified in Poll 1
[d] Common personal goals definitively identified in Poll 2 are bold underlined

## DISCUSSION

In the study by Searchfield [24], participants were asked to nominate up to five goals for tinnitus treatment with as much detail as possible. The participants were helped to formulate their goals in a realistic way. After strict categorization procedures of the answers and statistical analysis of the results, six common (>10% of responses) tinnitus treatment goals were identified: (1) Reducing tinnitus' effects on Hearing. (2) Improved wellbeing and being less depressed. (3) Coping with or controlling the tinnitus. (4) Managing the effect of the environment (context) on tinnitus. (5) Improving sleep. (6) Understanding tinnitus. These goals were quite consistent with a previous study exploring difficulties encountered by persons with tinnitus [25]. We confirmed five out of six preliminary common personal goals identified by Searchfield [24]. This confirmation comes from a heterogeneous sample of people with bothersome tinnitus, while the Searchfield study involved a clinical sample.

One important limitation of this study is that, in poll 1, every respondent was asked for his or her additional personal goal if they had any, on which following respondents could vote for. However, that implies that every last added personal goal has potential less followers who can vote for it, than preceding personal goals. Because of the procedure that only goals which reach a minimum of 10% of the votes, would be counted as a common personal goal, there is a chance that some late added goals have not been identified as common because of this methodological aspect of the study. We have tried to counteract this by leaving the poll open for a week after each added goal, until respondents could vote for a week in which no new goal was added.

Two potential limitations are related to a possible selection bias. The first is that of the 5300 members of the source population only 4% has responded. The participation was strictly voluntary, so this may indicate a selection bias of people with specific personality traits. We know from previous research that personality traits are relevant to the degree of impact of tinnitus [6] and therefore probably also to personal goals for treatment. By adding the question whether respondents of poll 2 had also taken part in poll 1, we have tried to gain more insight into that possibility. We feel confident that the possibility of selection bias in determining the common personal goals is unlikely, because only 28% of the respondents in poll 2 participated for the second time. Although we cannot exclude that a personality difference underlies the active or passive attitude of members of the FB group (the total group of potential respondents of 5300 group members also consists of actively chatting and passively reading members), we consider this heterogeneity precisely as an advantage of this sample rather than a risk of bias, as we believe it favors the generalizability of the findings to the overall tinnitus population which is also known to be heterogeneous after all. As for the second possible selection bias, in an online

chatgroup, people who do not use social media or even possibly internet itself, may be underrepresented in our sample. Those people, e.g., the elderly, might just be a group of people in which tinnitus is relatively common due to its relationship with hearing impairment. However, in figure 1 we show a normal distribution of age in our sample, so we consider this bias to be negligible. Although we do not know what the distribution is in the subgroup of people aged 73 to 95+ (or whether any participants are older than 80 or 90 at all), we suspect that there is little clinical relevance, because tinnitus in aging seems a symptom that is usually due to an identifiable disease, and according to the scarce literature, is rarely of subjective type, high-pitched, irreversible or idiopathic [26]. Another limitation concerns missing data. Although adding up all votes to the statements "I am a man" and "I am a woman" shows that there were 238 respondents, not every respondent voted for every statement. Consequently, some percentages are based on smaller numbers of respondents than 238, which gives the percentages less weight.

In summary, it may be true that the identification of personal treatment goals through personal contact in order to be able to evaluate a client's satisfaction of a treatment, would be the optimal way to evaluate a (general) treatment from a clinical point of view. In research of treatment efficacy however, that would be extremely inefficient. We confirmed five *common* personal tinnitus treatment goals of people who are bothered by chronic tinnitus and therefore consume health care until they feel subjectively helped and satisfied. In our opinion, if a patient achieves these treatment goals, it is likely that he will be more satisfied with the treatment and, as a result, will discontinue or reduce his consumption of care, after which he will start coping. In our experience, it's only after successful coping that psychological constructs like mood or functional disabilities, measured by regular tinnitus questionnaires, are likely to improve. Evaluation of treatment based on goal attainment, could therefore increase the validity of the treatment evaluations in terms of adaptability.

**Fig.3 The Goal Attainment Scale in Tinnitus Treatment (GAS-T)**

| **Goal Attainment Scale for Tinnitus (GAS-T)** | Level of Treatment Result | | | | | Attained Level |
|---|---|---|---|---|---|---|
| Common Personal Tinnitus Treatment Goal | *Much less* result than expected -2 | *Somewhat* less result than expected -1 | *Expected* result 0 | *Somewhat more* result than expected +1 | *Much more* result than expected +2 | |
| to be able to cope better with tinnitus by gaining control over tinnitus | | | | | | |
| to improve my well-being and feel less depressed or anxious | | | | | | |
| to improve my sleep | | | | | | |
| to reduce the negative effect of tinnitus on hearing | | | | | | |
| to better understand my tinnitus | | | | | | |
| | | | | | Total score: T-score: | |

To conclude, our findings add to the tinnitus research- and clinical practice that it makes it possible to create a closed-end Goal Attainment Scale in Tinnitus treatments based on the clients' needs, with the aim of including in treatment effect evaluations also the subjective satisfaction with regard to patients expectations, in addition to changes in health-related factors. See figure 3 for our proposal of GAS-T, to be used in tinnitus treatment efficacy evaluations . We consider the GAS-T to be generalizable, because the goals identified are based on a heterogeneous group of people with bothersome tinnitus, which should be an appropriate reflection of the total tinnitus population. However, for standard use it is necessary that the GAS-T will be validated in future research.

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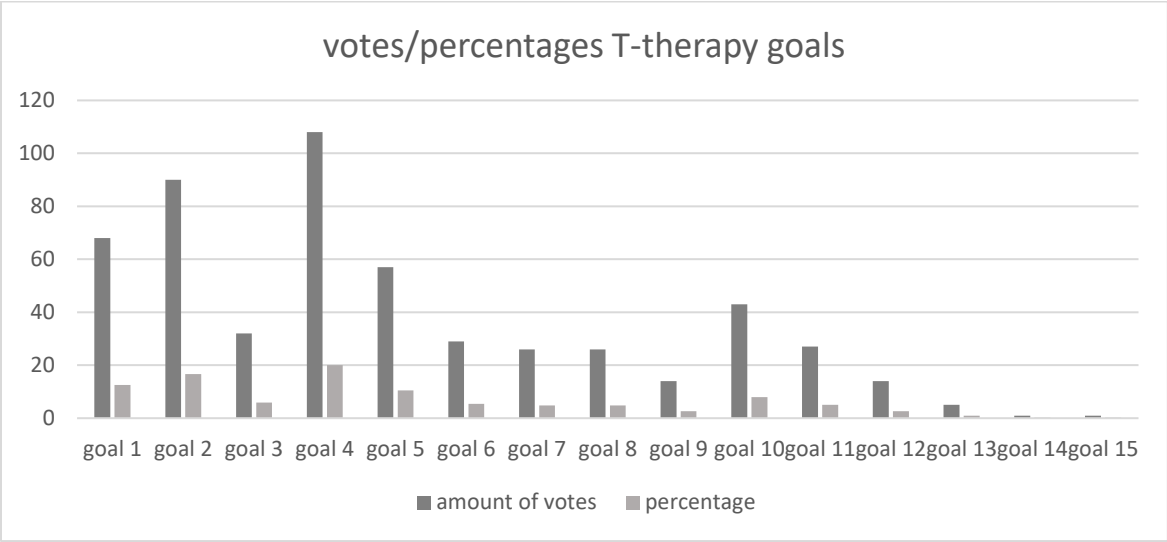
*SI 1. visualization of table 1.*




**Article title:** GOAL ATTAINMENT SCALE IN TINNITUS (GAS-T): TREATMENT GOAL PRIORITIES BY CHRONIC TINNITUS PATIENTS IN A REAL-WORLD SETTING.

**Journal:** European Archives of Oto-Rhino-Laryngology

**Corresponding author:** Wagenaar, Olav; Department of neurology, Rijndam Rehabilitation Center, Rotterdam, The Netherlands. Email: Owagenaar@rijndam.nl

**Author names:**

Wagenaar, Olav
Gilles, Annick
Van Rompaey, Vincent
Blom, Henk

*SI 2. Comparison of content of earlier identified common goals vs. current additional personal goals in poll 1*

| Additional goals overlapping (no.7-15) | Preliminary identified common goals (no.1-6) | New vote percentage |
|---|---|---|
| No.7 (4.8%) | No.3 (5.9%) | No.3: 10.7% |
| No.8 (4.8%) | No.4 (20%) | |
| No.9 | No overlap | |
| No.10 (7.9%) | No.4 (24.8%) | No.4: 32.7% |
| No.11 (5.0%) | No.2 (16.6%) | |
| No.12 | No overlap | |
| No.13 | No overlap | |
| No.14 (0.2%) | No.2 (21.6%) | No.2: 21.8% |
| No.15 | No overlap | |

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