

# Experiencing Tinnitus: Which Factors Are Important for Perceived Severity of the Symptom?

Josef Unterrainer,<sup>1</sup> Karoline V. Greimel,<sup>2</sup> Max Leibetseder,<sup>3</sup>  
and Thomas Koller<sup>4</sup>

<sup>1</sup>Department of Neuropsychology, University of Freiburg; <sup>2</sup>County Hospital, Tinnitus Ambulance, and <sup>3</sup>Social Medical Office, Salzburg; and <sup>4</sup>Free Consulting, Wien, Germany

**Abstract:** This study attempted to determine those factors important for predicting the experienced severity of tinnitus. For this purpose, we examined affected patients' perception of tinnitus as an illness, comorbidity, scores on locus of control, length of time since onset of tinnitus, pitch and loudness of tinnitus sounds, and depression. One hundred and forty-nine patients (72 women, 77 men) experiencing chronic tinnitus participated in our study. An ordinal logit regression analysis showed that depression and loudness of tinnitus sounds were the best predictors of perceived severity of tinnitus and were followed in importance by the internal locus of control. In contrast, the patients' perception of tinnitus as an illness and comorbidity had no predictive value on the severity of tinnitus. These findings underscore the predominant role of depression, loudness of tinnitus, and internal locus of control in patients with tinnitus and provide an overview of relevant factors concerning tinnitus described in studies to date.

**Key Words:** comorbidity; depression; illness; locus of control; perception; tinnitus sounds

Tinnitus is defined as the perception of sounds in one or both ears or in the head in the absence of any external stimulus. In most cases, the duration of tinnitus is very short or patients habituate to their symptoms. In 0.1 to 1.0% [1], patients experience tinnitus as extremely disturbing when it becomes chronic. The psychological explanations for the mechanisms of chronicity [2] emphasize disposition influences, such as increased neurotic or hypochondriac personality traits [3–5], high prevalence of affective disorders [6–9], or cumulated incidence of somatoform disorders [10]. An extensive model for describing a nonfunctional habituation was presented by Hallam [11]. This model states that if tinnitus is variable, it constantly re-attracts the attention, thus rendering it difficult to habituate.

The absence of adequate coping strategies is seen as one of the main problems for chronicity or a nonfunc-

tional habituation of tinnitus [12]. In the present literature, heterogeneous conceptual terms concerning perception of and coping strategies for tinnitus and the diversity of research methods render comparisons among studies difficult. For example, Kirsch et al. [13] distinguished between *low* and *high copers*. They found that low copers were significantly more psychologically distressed than were high copers. High copers were similar to nonpatient control subjects, whereas low copers showed psychological profiles that were similar to chronic pain patients.

Analogously, Budd and Pugh [14] identified two coping strategies that they termed *maladaptive* and *effective*. Relations between subjective tinnitus severity and emotional distress could be found in patients with maladaptive coping but not in those with effective coping.

A similar dichotomy was also found by Hallberg and Erlandsson [15], who investigated two distinct groups of patients regarding location, complexity, and fluctuation of tinnitus. One group of patients, who had sought professional help, were called *complainers*. Conversely, the second group, who did not seek help for their tinnitus, were named *noncomplainers*. The

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Reprint requests: Josef Unterrainer, Ph.D., Institut für Psychologie und Neuropsychologie, Engelbergerstraße 41, 79085 Freiburg, Germany. Phone: 0049/761/203-2464; Fax: 0049/761/203-9438; E-mail: unterrai@psychologie.uni-freiburg.de

results showed that complainers suffered from a higher incidence of multiple combined tinnitus sounds and from nonfluctuating tinnitus as compared to noncomplainers. Accordingly, complainers scored significantly higher than did noncomplainers on psychological variables, such as concentration difficulties, irritability, and sleep disturbance.

Similar data were presented by Dineen et al. [16] in tinnitus patients who had previously sought assistance. These patients differed from those who had not sought assistance previously in terms of complexity of the tinnitus sounds, level of emotional reaction, and use of coping behaviors.

The locus of control in patients could serve as an explanation for the use of different coping strategies. Budd and Pugh [6] demonstrated that the severity of tinnitus correlated with external locus of control; conversely, a negative correspondence emerged between internal locus of control and tinnitus impairment. The locus of control seemed to affect tinnitus severity only indirectly, because partial correlations indicated that this effect was mediated by the locus of control on anxiety and depression.

Besides psychological evaluations of the perception of tinnitus, numerous studies have described inconsistent findings about psychoacoustic measurements (pitch and loudness of tinnitus) and duration of tinnitus since onset. Van Veen et al. [9] could not demonstrate a significant correlation between tinnitus severity and loudness of tinnitus. Folmer et al. [17] found no difference in the reported loudness of tinnitus between patients with and without depression, although depressive patients scored significantly higher on questions relating to tinnitus severity than did patients without depression. In contrast, Henry and Wilson [18] reported that the more severely distressed tinnitus sufferers experienced loud tinnitus as compared to less severely distressed tinnitus sufferers. Sullivan et al. [19] showed that the antidepressant nortriptyline decreased tinnitus loudness in patients experiencing severe chronic tinnitus. The pitch of tinnitus sounds does not seem to have a strong impact on tinnitus severity [20,21], although Andersson et al. [22] showed that pitch served as a significant predictor for classifying different levels of tinnitus distress, especially for more severely distressed patients. Some authors stressed the importance of the duration of tinnitus since onset [20,23]. Their results revealed that tinnitus loudness and severity increased as a function of years since onset. Taken together, the reported studies do not provide homogeneous findings of relevant factors that should have an important impact on tinnitus severity.

The aim of our study was to identify factors important for predicting the experienced severity of tinnitus. The Tinnitus Handicap Inventory was the dependent

variable. The predictive variables were the patients' perception of tinnitus as an illness (as an indicator of maladaptive or effective coping), comorbidity, scores on locus of control, length of time since onset of tinnitus, loudness and pitch of tinnitus sounds, and depression. We hypothesized that the perception of tinnitus as an illness, comorbidity, depression, duration of tinnitus, and internal locus of control are significant predictors for the perceived severity of tinnitus.

## SUBJECTS AND METHODS

### Subjects

One hundred and forty-nine patients (72 women, 77 men; mean age, 51.6 years; standard deviation [SD], 14.2) experiencing chronic tinnitus participated in this study. The patients were recruited from the head and neck department of the General Hospital of Salzburg and from an ear, nose, and throat practice in Traunstein (Germany). The patients had experienced tinnitus for a mean duration of 71.1 months (SD, 98.8).

At the beginning of the study, subjects were asked to report via a questionnaire whether they experienced tinnitus as an illness; 60.4% answered negatively and 39.6% answered affirmatively. Subjects went on to report whether other illnesses were present and, if so, to describe them (comorbidity present in 47%, denied in 53%). An additional classification into physical and psychological comorbidity failed, as many patients reported that they experienced both illnesses.

### Instruments

Tinnitus impairment was measured with a German version of the Tinnitus Handicap Inventory (THI-12) [24] as adapted by Newman et al. [25]. This instrument is composed of 12 items and includes two subscales: emotional-cognitive and functional-communicative. Patients also had to rate on a 10-point numeric scale the loudness and pitch of tinnitus sounds that they perceived.

Depression was measured using the Allgemeine Depression Skala (general depression scale) of Hautzinger and Bailer [26], a modification of the depression inventory Center of Epidemiological Studies–Depression (short CES-D) of Radloff [27] and Hautzinger [28], with higher scores indicating a more severe depression.

The locus of control was assessed with a German instrument from Lohaus and Schmitt [29] (control with respect to illness and health). This instrument consists of three components: internality (patients believe that they are responsible for health or illness), social externality (patients prefer to contact persons of confidence or specialists), and fatalistic externality (patients refer

**Table 1.** Predictive Variables of Tinnitus Impairment

Factor	Estimate	SE	Beta	T Value	p Value
Depression	.111*	.019*	.216*	5.842*	.000*
Tinnitus sounds					
Loudness	.371*	.093*	.146*	3.989*	.000*
Pitch	.086	.085	.031	1.021	.308
Locus of control					
Internal	-.087*	.034*	-.084*	-2.561*	.010*
External	.052	.034	.049	1.556	.122
Fatalistic	.026	.024	.031	1.099	.275
Time from onset	-.000	.002	-.010	-.296	.737
Perception as illness	.016	.450	-.002	-.035	.972
Comorbidity	-.050	.405	.004	.125	.900

\*Significant results.

problems to fate or chance or God). The higher the scores in the specific domains, the stronger the respective locus of control.

### Statistical Analysis

An ordinal logit regression analysis was used to identify the important factors driving the experience of tinnitus.

### RESULTS

The results of the ordinal logit regression analysis showed that depression, loudness of tinnitus sounds, and internal locus of control are the only significant predictors of the experienced tinnitus impairment (Table 1).

### DISCUSSION

As expected, depression was a high significant predictor of tinnitus severity and confirms the results reported in the present literature [6–9,30]. The finding that the loudness of tinnitus sounds has a strong impact on the experienced severity of tinnitus is in line with the results of Henry and Wilson [18] and Sullivan et al. [19] but contradicts the study of Van Veen et al. [9]. The latter authors could not show an association between the loudness of tinnitus and perceived tinnitus severity. Folmer et al. [17] also failed to reveal significant differences in the reported loudness of tinnitus between patients with and without depression. If depression and loudness of tinnitus are both predictors of tinnitus severity, one would expect that depressed patients suffer from the loudness of tinnitus as well.

The pitch of tinnitus sounds had no predictive value on tinnitus severity. This finding agrees with the study by Stouffer et al. [20], whose results revealed that tinnitus pitch tended to remain stable even when the severity

of tinnitus changed (see also Newman et al. [31]). The length of time since onset of tinnitus was not a significant predictor in this examination. This finding contrasts with those of previous studies [20,23]. The results of Stouffer et al. [20] and Scott et al. [23] showed that tinnitus loudness increased as a function of years since onset. With respect to the present data, one could also expect a strong influence of the duration of tinnitus on the Tinnitus Handicap Inventory, but that was not the case. These discrepancies, as well as those described between depression and loudness of tinnitus, could be explained by the more powerful statistical analysis used in this study.

The hypothesis that the internal locus of control is a relevant predictor for tinnitus severity could also be confirmed. Patients who believe themselves to be responsible for health and illness showed values on the Tinnitus Handicap Inventory lower than those of patients with an external or fatalistic locus of control. These results are in agreement with the studies of Budd and Pugh [6] and Scott et al. [23], who could show that increased control implies both a decrease in discomfort from tinnitus and better adaptation.

Contrary to the assumptions made in our study, neither the perception of tinnitus as an illness nor comorbidity could predict perceived tinnitus severity. One explanation could be that the simple distinction between a patient's perception of tinnitus as an illness or not does not reflect maladaptive-effective or low- and high-coper classifications. Patients who define tinnitus as an illness may have learned to live with tinnitus and therefore could also be termed *effective copers*. This would explain the missing impact of comorbidity on tinnitus severity. If patients are able to deal with other illnesses as well, the influence on tinnitus severity should be minimized: That is, patients without depression and having low tinnitus loudness and internal locus of control scores could achieve low tinnitus severity ratings, although they define tinnitus as an illness and report comorbidity.

In summary, our data appear to confirm findings of some previous studies but also to attenuate some factors that were described in the literature as important for the perception of tinnitus severity. The benefit of this investigation lies in the significant sample size, the large number of variables included in the computation, and the powerful statistical analysis.

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