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The Distressed (Type D) Personality Is Independently Associated With Tinnitus: A Case–Control Study

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Background: Tinnitus is a common and disturbing condition, reported by 10% to 20% of the general population. **Objective:** The authors sought to determine personality characteristics associated with tinnitus patients versus a control group of ear-nose-throat (ENT) patients without tinnitus. **Method:** Adult chronic tinnitus sufferers (N=265) and ENT patients without tinnitus (N=265) participated in a cross-sectional study. The authors evaluated personality characteristics with tests for distressed personality (Type D), neuroticism, extraversion, and emotional stability. **Results:** As compared with control subjects, tinnitus patients had statistically significant and clinically relevant higher levels of neuroticism, negative affectivity, and social inhibition, on one hand, and lower levels of extraversion and emotional stability on the other hand. Also, tinnitus patients were more likely to have a type D personality. **Conclusions:** Neuroticism, reduced extraversion, and reduced emotional stability were associated with tinnitus, but the level of prediction of the model improved with the addition of type D personality to the single traits. This might indicate that personality characteristics, and type D personality, in particular, are associated with having tinnitus and might contribute to its perceived severity.

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Tinnitus is an auditory phantom perception of sound in the absence of an acoustic stimulus. As a consequence of a reduced afferent input, neural plastic processes generate tinnitus in the central parts of the auditory system. Tinnitus is a common and disturbing condition, reported by 10% to 20% of the general population.^{1,2} In a sample of 1,275 subjects across 11 countries, the overall prevalence of tinnitus was 11%, with a higher prevalence in patients with somatization disorder (42%) or hypochondriacal disorder (27%).³ Tinnitus is more prevalent in men than women, and its occurrence seems to increase with advancing age.^{1,2,4} Perceived tinnitus severity affects patients' quality of life, including physical, emotional, and social functioning, and it induces psychological distress, such as anxiety and depression.^{3,5–11} However, not all patients with tinnitus experience the same levels of dis-

tress and the same impairments to quality of life; personality characteristics likely play an important mediating role.

Personality factors, including neuroticism and extraversion, assessed before the onset of tinnitus, have been shown to predict the development of tinnitus perceived as severe.^{9,11} Some personality characteristics previously re-

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ported to be associated with tinnitus are hysteria and hypochondriasis,^{5,7,11,12} neuroticism,^{9,13,14} reduced extraversion,^{9,13,14} withdrawal,^{5,15} emotional isolation,¹⁵ and psychasthenia.^{16,17} Psychasthenia refers to feelings of low self-confidence, anxiety, heightened sensitivity, moodiness, and the inability to resist undesired maladaptive behaviors. Also, the use of particular cognitive strategies, like catastrophic and dysfunctional thoughts, which increase patients' emotional distress and perceived tinnitus severity, may be attributed to personality factors.^{6,18} Although the role of personality factors in tinnitus has been examined extensively, these studies have focused on single traits rather than the combination of traits.

In order to investigate which personality characteristics distinguish help-seeking tinnitus sufferers from general ear, nose, and throat (ENT) patients without tinnitus, we examined the following personality traits: neuroticism, extraversion, emotional stability, and Type D personality. The Type D (distressed) personality is defined by the combination of two stable personality traits: negative affectivity and social inhibition.¹⁹ Type D patients tend to experience increased negative emotions and generally feel sad and have a gloomy view of life; this is paired with the tendency not to share these emotions with others because of fears over how they may react.¹⁹ Consequently, these individuals also generally have fewer personal ties and hence frequently lack social support.^{19,20} The Type D construct was developed in patients with ischemic heart disease and validated across groups with cardiovascular disease. There is increasing evidence that patients with this personality taxonomy comprise high-risk patients, with this personality type modulating their health-related functional status, quality of life, and clinical, patient-based outcomes.²¹⁻²³ In other words, Type D patients seem to be susceptible to experiencing a wide range of negative emotions when confronted with overpowering health problems. This negativity may also extend beyond cardiovascular disease to other chronic conditions, such as tinnitus.

The objectives of this study were to investigate 1) whether the personality characteristics of neuroticism, extraversion, emotional stability, and Type D personality were more prevalent in patients with tinnitus versus ENT patients without tinnitus; and 2) whether Type D personality could be a discriminating factor between tinnitus and ENT patients, adjusting for neuroticism, extraversion, and emotional stability. Since the Type D construct was developed and validated only in groups with cardiovascular disease, it would be necessary to test the measurement model of this personality trait among tinnitus patients and

control subjects before performing multivariate comparisons. In order to confirm the assessment of the hypothesized dimensions of the Type D personality trait among tinnitus sufferers, we further tested the hypothesis that 3) there is support for the separation of negative affectivity and social inhibition, subjecting the items from the Type D questionnaire (DS-14) to confirmatory factor analysis.

METHOD

Patients and Measures

Consecutive chronic subjective tinnitus sufferers (N=265) and consecutive ENT patients without tinnitus (N=265) seen at the Department of Otorhinolaryngology of the University Medical Center, Groningen, The Netherlands, were included in the current study. Tinnitus sufferers age ≥ 20 years were included, provided that they were consulting our clinic for tinnitus only. They were all suffering chronically from tinnitus, defined by a period of longer than 3 months. Tinnitus patients were excluded if tinnitus was not the sole reason for consulting our clinic or if they had objective tinnitus (determined by means of a diagnostic protocol for tinnitus) or chronic disease comorbidity. The control subjects comprised patients age ≥ 20 years, visiting the otorhinolaryngologist for all sorts of symptoms except tinnitus, without severe ailments affecting physical and emotional functioning, who indicated they were not suffering from tinnitus. Control patients were excluded if they had clinical indications of subjective or objective tinnitus, or chronic disease comorbidity. The study protocol was approved by the local medical ethics committee, and all patients provided written, informed consent.

Age and gender were entered as reported by patients in the questionnaire. Marital status or living arrangement was defined as: 1) living with a partner; or 2) living alone. Educational status was defined as: 1) elementary school; 2) grade-school; 3) secondary school; 4) higher professional training; and 5) college education/university. Work status was defined as 1) working; and 2) not working (housewives were classified as working).

Neuroticism and Extraversion

The neuroticism (EPQ-N) and extraversion (EPQ-E) scales were selected from the revised Eysenck Personality Questionnaire (EPQ-R²⁴), using the validated Dutch translation of this questionnaire.²⁵ Both the EPQ-N and the EPQ-E scales comprise 12 items, with a response scale

of 1 (Yes) and 0 (No). Scores are summed to yield a total score, which, for the EPQ–N and EPQ–E ranges from 0 to 12. Higher scores indicate a higher degree of neuroticism or extraversion. The EPQ–N scale is a measure of emotional instability, with high values indicating that individuals have high levels of negative affect, such as worrying, moodiness, depression, and anxiety. The overly emotional individual may react strongly to a variety of stimuli, whereas the low EPQ–N individual may be called “stable” and is usually even-tempered and controlled. High values on the EPQ–E scale predispose to high levels of sociability, positive affect, and need for external stimulation. The extrovert is a carefree, easy-going person, who is usually quite optimistic, whereas the introvert is a person who appears reserved and cautious. The EPQ–N and EPQ–E were assessed in seven Dutch studies²⁵ and showed, on average, strong levels of internal consistency, with Cronbach α values of 0.84 and 0.81, respectively.

Type D Personality

Type D personality was assessed with the 14-item Type D Scale (DS-14).¹⁹ The scale consists of 14 items that are answered on a 5-point Likert scale, from 0 (False) to 4 (True). Type D personality characterizes those who tend to experience increased negative emotions and who do not express these emotions in social interactions. The DS-14 consists of the subscales Negative Affectivity (NA: 7 items; e.g., “I often feel unhappy.”) and Social Inhibition (SI: 7 items; e.g., “I am a ‘closed’ person.”). A standardized cutoff score of ≥ 10 on both subscales denotes those with a Type D personality.²⁶ The DS-14 has adequate reliability, with Cronbach α 0.89/0.88 and 3-month test–retest reliability of 0.72/0.82 for the NA and the SI subscales, respectively.¹⁹

Emotional Stability (ES)

Emotional Stability (ES) was assessed with a subscale of the Five-Factor Personality Inventory (FFPI).^{27–29} The ES scale consists of 20 items, with 10 items representing the positive pole and 10 items representing the negative pole of this personality trait. Negative/positive items are reversed, such that higher scores indicate a higher level of emotional instability and lower scores, stability. Patients indicated per-item the extent to which, on a 5-point Likert scale, the trait was applicable to them, from 1 (not at all applicable) to 5 (entirely applicable). An emotionally stable person can take his or her mind off his or her problems,

readily overcomes setbacks, tends always to be in the same mood, does not invent problems for himself/herself, and is not frequently overwhelmed by emotions.²⁸ To avoid response bias that may have arisen from experiencing tinnitus, the general instruction was preceded by a situation-specific instruction: “Please do not let your answers be influenced by your current condition resulting from your illness or by any other reasons for having been referred to the hospital.” The reliability and construct validity of this instrument has been well established.^{29–31} In previous studies, the FFPI Emotional Stability (ES) scale showed satisfactory levels of internal consistency, with Cronbach α ranging from 0.81 to 0.85.^{28,29,32}

Statistical Analysis

Discrete variables were compared with the chi-square test (Fisher’s exact test when appropriate, difference of proportions test³³) and are presented as frequencies and percentages. Continuous variables were normally distributed (Shapiro-Wilk, $p > 0.05$), and were therefore compared with the Student *t*-test and are presented as mean (standard deviation [SD]). Effect sizes (Cohen’s δ) were calculated only for the statistically significant results, since differences between groups that are due to sample fluctuation have no clinical relevance. Cohen’s δ for unrelated samples was used to estimate the magnitude of the difference between two groups (mean difference score/pooled SD) to avoid overestimation of the effect with Cohen’s thresholds.³⁴ According to these thresholds, an effect size of < 0.20 indicates a trivial difference; an effect size of ≥ 0.20 to < 0.50 , a small difference; an effect size of ≥ 0.50 to < 0.80 , a moderate, and an effect size ≥ 0.80 , a substantial difference.³⁵ In the current study, an effect size ≥ 0.20 was considered to be a clinically relevant difference between groups. All statistical tests were two-tailed. A *p* value of < 0.05 was used for all tests to indicate statistical significance. All statistical analyses were performed with SPSS 13.0.1 for Windows.

Since the DS-14 was being used for the first time in tinnitus patients, confirmative factor analysis (CFA) was applied to test the construct validity of the NA and SI subscales. Previous studies investigating the factor structure of the DS-14 have used exploratory factor analysis (EFA), rather than CFA.^{19,36,37} Confirmation of the hypothesized factor structure of NA and SI components is most adequately established by using CFA, which is a special type of structural-equation modeling.^{38,39} In CFA, the factor structure is explicitly hypothesized and is tested

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for its fit with the observed covariance structure of the measured variables. CFA can be used to compare the equivalence of factor structures in different samples.^{40,41} Because of this, CFA is more appropriate than EFA for assessing the replicability of the DS-14 two-factor model across different samples. CFA also offers a wide variety of statistical tests and indices designed to assess the “goodness-of-fit” of identified models; thus, it provides a straightforward evaluation of the proposed factor/theoretical structure of the DS-14. Model fit was assessed by multiple criteria, as suggested by Bentler and Bonett:⁴² 1) a nonsignificant χ^2 indicates that a nonsignificant amount of variance in the data remains unexplained; however, a statistically significant χ^2 can often be produced as an artifact of sample size and small variations in the data;⁴³ 2) normed fit index (NFI); 3) non-normed fit index (NNFI); 4) comparative fit index (CFI); and 5) the root mean-square error of approximation (RMSEA). The NFI, NNFI, and CFI fit-indices indicate the extent to which the results fit the model that is being explored, with a value >0.9 conventionally being adopted as evidence of a satisfactory fit.^{44,45} An RMSEA with values of less than 0.08 indicates a good fit to the data,⁴⁶ whereas values greater than 0.10 suggest strongly that the model fit is unsatisfactory.^{47,48} The CFI and RMSEA were used because they are reputed to provide more stable and accurate estimates than several of the other fit-indices.^{47,48}

Initial analyses showed that the model fit would be improved if a correlation between the latent variables were allowed, and so all analyses presented allow for this correlation. Furthermore, results from EFA in other studies indicated that the SI item “I often feel inhibited in social interaction,” tended to correlate at >0.30 with the negative affectivity (NA) component.^{19,37} Therefore, the Lagrange multiplier was used to assess whether the model fit would be improved if this SI item were allowed to be an indicator of the other latent-variable NA in the tested model. CFA was performed with LISREL software.³⁸

The reliability of all scales was examined with the internal-consistency coefficient Cronbach α for each construct. A Cronbach $\alpha \geq 0.70$ was considered sufficient.^{49,50} However, since the Cronbach α is dependent on the number of items in the scale, one can achieve a high internal-consistency reliability estimate by having either many items or highly intercorrelated items (or a combination of the two).⁵¹ Thus, the Cronbach α essentially is a function of two parameters: the number of scale items and the mean intercorrelation (MIIC) among the items.⁵² The degree of item intercorrelation is a straightforward indicator of in-

ternal consistency, whereas the number of items is entirely irrelevant. According to the guidelines of Briggs and Cheek,⁵³ the MIIC should fall in an optimal range between 0.20 and 0.50, but should not be less than 0.15.^{51,54} Therefore, taking the upper value of the range, an MIIC of ≥ 0.25 seems reasonable. When estimating the internal consistency of the scales, we used the following criteria: Cronbach α coefficient ≥ 0.70 and ≤ 0.90 ; and MIIC ≥ 0.25 . Scales with an $\alpha < 0.70$ and an MIIC < 0.25 were removed.

With tinnitus and no-tinnitus as the binary dependent variable, all demographic characteristics and personality traits were entered as independent variables into a forward-directed stepwise multiple logistic-regression analysis to define those traits that were assumed to be associated with tinnitus (versus no-tinnitus) and that would allow us to correctly separate both groups. A p value of 0.05 was used as the cutoff for sequentially entering and removing each variable. In the first step, age, education, gender, marital status (partner versus no-partner), work status (working versus not-working), neuroticism, extraversion, and emotional stability were entered in a multivariate model, whereas Type D personality was entered in the second step. Odds ratios (ORs) with 95% confidence intervals (CIs) are reported.

RESULTS

Patient Characteristics

Sociodemographic characteristics, stratified by tinnitus group versus control group, are presented in Table 1. Tinnitus patients were slightly older (55.38 [11.3] versus 50.46 [14.42]), and the group comprised more men than did the control group (69.8% versus 50.6%). Also, tinnitus patients were more likely to be married/have a partner (88.3% versus 78.1%), but less likely to be working than control subjects (52.1% versus 75.0%). Patients with elementary-and-lower education were equally distributed across both tinnitus and control groups. The proportion of subjects with elementary education was higher among tinnitus patients than controls; that is, 38.1% versus 27.4% (95% confidence interval [CI]: 2.5% – 18.8%). By contrast, compared with tinnitus patients, the proportion of patients with less education was statistically significantly overrepresented among control subjects (34.4% versus 25.9%; 95% CI: 16.4% – 0.04%).

TABLE 1. Sociodemographic Patient Characteristics Stratified by Tinnitus Versus Control Group Status

	Tinnitus (N=265)	Control Group (N= 265)	p
Age, years, mean (SD)	55.38 (11.30)	50.46 (14.42)	0.0001 ^a
Gender, N (%)			0.0001 ^b
Men	185 (69.8%)	134 (50.6%)	
Women	80 (30.2%)	131 (49.4%)	
Marital status, N (%)			0.001 ^b
Married/living with partner	234 (88.3%)	207 (78.1%)	
Unmarried, widowed, divorced	31 (11.7%)	58 (21.9%)	
Employment status, N (%)			0.0001 ^b
Employed	137 (52.1%)	198 (75.0%)	
Unemployed	126 (47.9%)	66 (25.0%)	
	N=247	N=259	95% CI^c
Educational level			
Primary school	94 (38.1%)	71 (27.4%)	2.5% to 18.8%
Elementary school	64 (25.9%)	89 (34.4%)	-16.4% to 0.04%
Secondary school	68 (27.5%)	70 (27.0%)	-7.3% to 8.3%
Higher professional training	8 (3.2%)	9 (3.5%)	-3.4% to 2.9%
College/university	13 (5.3%)	20 (7.7%)	-6.7% to 1.8%

SD: standard deviation; CI: confidence interval.

^a Student's *t*-test.

^b Fisher exact test.

^c Difference of proportions test.

Confirmatory Factor Analysis of the DS-14

Results of the CFA indicated satisfactory separation of NA and SI for tinnitus and no-tinnitus, as indicated by the five a priori criteria (Table 2). The Lagrange multiplier did not indicate that the model improved by allowing the SI item "I often feel inhibited in social interactions" to be explicitly an indicator of the other latent variable, NA. In each sample, the chi-square goodness-of-fit test was not statistically significant, and, with the comparative fit index (CFI), the normed fit index (NFI), the non-normed fit index (NNFI) (>0.9), and the root mean-square error of approximation (RMSEA; <0.06), all indices indicated a good fit for the model in our study population. This suggests that the DS-14 comprises two one-dimensional subscales, a finding that was confirmed in both tinnitus patients and control subjects.

Reliability of Personality Measures

In the current study, the NA and SI scales yielded Cronbach α coefficients of 0.90 and 0.87 in tinnitus patients and 0.82 and 0.87 in control subjects, respectively. In the total sample, the internal-consistency estimates were 0.91 and 0.88 for NA and SI, respectively. The homogeneity of the NA and SI subscales was also confirmed by the mean inter-item correlations: NA: 0.50 in the tinnitus sample and 0.41 in controls; SI: 0.49 in both tinnitus and control subjects. Within the total sample of tinnitus and control subjects, an MIIC of 0.52 and 0.51 were found for the NA and SI subscales, respectively, which are within the optimal range between 0.20 and 0.50.

The EPQ Neuroticism scale yielded Cronbach α s of 0.84 (MIIC: 0.32) and 0.86 (MIIC: 0.34) in the tinnitus and control group, respectively; EPQ Extraversion showed

TABLE 2. Confirmatory Factor Analysis (CFA) for the DS-14: Negative Affectivity and Social Inhibition as Separate Constructs

Sample	χ^2	df	p	NFI	NNFI	CFI	RMSEA	90% CI for RMSEA
Tinnitus	62.19	48	0.08	0.99	1.00	1.00	0.033	0.00-0.055
No-tinnitus	57.08	48	NS	0.99	1.00	1.00	0.027	0.00-0.050
Total sample	52.46	48	NS	0.99	1.00	1.00	0.013	0.00-0.032

DS-14: Type D questionnaire; NFI: normed fit index; NNFI: non-normed fit index; CFI: comparative fit index; RMSEA: root mean-square error of approximation; CI: confidence interval.

TABLE 3. Differences in Personality Traits Between Tinnitus Patients and Control Subjects, Mean (Standard Deviation)

Personality Characteristic	Tinnitus Patients	Control Subjects	p ^a	Effect Size (ES)	95% CI for ES	
Extraversion	5.83 (3.50)	8.14 (3.12)	0.0001	0.70	0.52	0.87
Neuroticism	5.70 (3.70)	3.20 (3.10)	0.0001	0.73	0.42	0.97
Emotional stability	50.93 (13.26)	42.75 (12.06)	0.0001	0.65	0.47	0.82
Negative affectivity	13.18 (7.32)	6.20 (4.85)	0.0001	1.12	0.94	1.31
Social inhibition	10.37 (6.49)	6.68 (5.33)	0.0001	0.62	0.45	0.80
Type D personality	no	yes				
Clinical group			0.001 ^b		17.9%	31.6%
Tinnitus group	171 (64.5%)	94 (35.5%)				
Control group	237 (89.4%)	28 (10.6%)				

CI: confidence interval.
^a *t*-test.
^b Fisher's exact test.

sufficient internal consistency, with α s of 0.87 (MIIC: 0.27) and 0.90 (MIIC: 0.35) in the tinnitus and control group, respectively. Emotional Stability yielded Cronbach α s of 0.93 (MIIC: 0.29) and 0.91 (MIIC: 0.29) in the tinnitus and control group, respectively.

Bivariate Analysis of Personality Traits Between Tinnitus and Control Subjects

Table 3 describes the means, SDs, *p* values, and effect sizes for the various personality traits assessed in both groups. Compared with control subjects, tinnitus patients had statistically significant (*p* < 0.05) and clinically relevant (ES > 0.20) higher levels of Neuroticism, Negative Affectivity, and Social Inhibition, on the one hand, and lower levels of Extraversion and Emotional Stability, on the other hand. Also, tinnitus patients were more likely to have a Type D personality than were controls (Fisher's exact test, 1 df; 35.5% versus 10.6%; *p* < 0.001).

Logistic-Regression Analysis

In the stepwise multiple logistic regression, the four personality traits and the five demographic personal characteristics entered the model to define those demographic and personality traits that were associated with tinnitus and therefore might contribute to a correct classification of patients with tinnitus.

The results of this logistic-regression analysis are summarized in Table 4. Male patients had a twofold higher risk than female patients of getting tinnitus (OR: 2.03; 95% CI: 1.32–3.13; *p*=0.01).

Control subjects were more likely to be working (OR: 0.55; 95% CI: 0.34–0.89), but less likely to be living together with a partner (OR=0.47; 95% CI: 0.27–0.84) than tinnitus patients. Education level did not affect the risk of tinnitus.

In multivariate analysis, the personality traits Neurot-

TABLE 4. Multivariate Logistic-Regression Analysis: Predictors of Tinnitus Status

Variable (in order of entry)	Regression Coefficient (β)	Standard Error	Wald Statistic	p	Odds Ratio	95% CI	
						Lower	Upper
Demographics							
Male gender	0.710	0.220	10.360	0.001	2.03	1.32	3.13
Age	0.004	0.009	0.153	0.70	1.00	0.99	1.02
Employment	-0.606	0.248	5.981	0.01	0.55	0.34	0.89
Higher education	0.010	0.053	0.040	0.84	1.01	0.91	1.12
Married/having a partner	-0.743	0.292	6.468	0.01	0.47	0.27	0.84
Personality traits							
Neuroticism	0.079	0.039	4.071	0.044	1.08	1.00	1.17
Extraversion	-0.114	0.035	10.713	0.001	0.89	0.83	0.96
Emotional stability	0.022	0.010	4.447	0.035	1.02	1.00	1.04
Type D personality	0.692	0.312	4.937	0.03	2.00	1.09	3.68

CI: confidence interval.

icism (OR: 1.0.8; 95% CI: 1.00–1.17), Emotional instability (OR: 1.02; 95% CI: 1.00–1.04), and Introversion (OR: 0.89; 95% CI: 0.83–0.96) were associated with tinnitus and might increase the risk of developing tinnitus. This analysis showed that tinnitus patients tended to have higher scores on Neuroticism and Emotional Stability (indicating a tendency toward emotional instability), but lower scores on Extraversion and were more likely to have a Type D personality as compared with control subjects.

In a final analysis, we investigated whether the addition of the Type D personality to a multivariate model comprising demographic characteristics and the personality traits of Neuroticism, Extraversion, and Emotional Stability, improved the level of prediction for tinnitus. All personality traits were associated with tinnitus, but, as indicated by the -2 log-likelihood function, the level of prediction of the model improved with the addition of the factor of Type D personality ($\chi^2=5,066$; df: 1; $p=0.02$).

Comparison of the number of patients actually classified in each group (tinnitus versus no-tinnitus) with the number predicted in each group was evaluated with the Hosmer-Lemeshow statistic, with a good model producing a nonsignificant chi-square. The goodness-of-fit of the model was acceptable (chi-square: $p=0.18$), indicating that, with regard to the statistically significant sociodemographic and personality characteristics, most of the subjects with tinnitus were in the higher deciles of risk, and most without tinnitus were in the lower deciles of risk.

DISCUSSION

The results of our study showed that the personality characteristics of neuroticism, extraversion, emotional stability, and Type D personality were factors capable of distinguishing tinnitus patients from general ENT patients without tinnitus. Tinnitus patients had higher scores on all single traits and were more likely to have a Type D personality. The results of the multivariate model showed that all personality traits were associated with tinnitus, but that the level of prediction of the model improved with the addition of Type D personality to the single traits of neuroticism, extraversion, and emotional stability. Several differences were also found for the demographic characteristics between tinnitus patients and control subjects, with tinnitus patients more likely to be men and married/with a partner, but less likely to be working. Age did not differ significantly between the tinnitus and control groups.

Of the four personality characteristics investigated in our study, only neuroticism and extraversion have been

investigated in previous studies of tinnitus patients. Other studies (except that of Wilson *et al.*⁵⁵) evaluating neuroticism in tinnitus sufferers also found a significant positive correlation between neuroticism and perceived tinnitus severity.^{9,13,14} Similarly, some^{9,13} but not all studies,¹⁴ found significant inverse correlations between reduced extraversion and perceived tinnitus severity. To our knowledge, this is the first study to examine the role of emotional stability in tinnitus, whereas previous studies have predominantly described the personality trait of “emotional stability” as being part of a personality profile, for example, such as “psychotic characteristics of the MMPI.”^{5,15} These psychotic characteristics include increased levels of social introversion, anxiety, internal conflict, withdrawal, emotional isolation, and nonconformity. Significantly elevated scores on this personality disposition were found in these two studies.^{5,15}

The results of the CFA in our study confirmed unambiguously that the Type D Scale fits the proposed model, confirming the measure’s validity. This validity was only evaluated previously in patients with cardiovascular diseases. The results of our study have shown that the prevalence of Type D personality was significantly higher among our group of help-seeking tinnitus patients, as compared with a control group. These results agree with those of Aquarius *et al.*,²¹ who found that Type D personality was significantly more prevalent in patients with peripheral arterial disease, as compared with healthy controls. Since Type D patients are susceptible to experiencing a wide range of negative emotions, including anxiety and depression, when confronted with overpowering health problems such as tinnitus, patients with this personality taxonomy may experience more severe tinnitus.

To date, the majority of studies on tinnitus patients have used a relatively small, randomly-selected group of patients based on a cross-sectional design, without (matched) controls. Cross-sectional designs inhibit testing the hypothesis about whether tinnitus sufferers differ in a statistically significant and clinically relevant way from non-tinnitus subjects for personality traits. In the current study, we used a group-matched design, even though matching was not successful, and patients differed on several demographic characteristics, including gender and age. More reliable and valid results might have been found had cases been individually matched to controls for relevant characteristics in a sufficiently large sample. This is a weakness of the study. Furthermore, since there is no consensus as to which personality traits may play a role in tinnitus, a heterogeneous set of measures was used in

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previous studies, including the normal or short version of the MMPI,^{5,7,15,17,56–58} the EPQ,^{9,13,14,55} and the DSM-III-R or DSM-IV classification for psychiatric disorders.^{7,10,59–62} This heterogeneity makes comparisons between studies difficult and hinders us from conducting metaanalyses.

The higher prevalence of male subjects among tinnitus patients found in the current study is in accordance with the results of other studies.^{1,2,4} Although tinnitus has previously been described as increasing with advancing age,^{1,2,4} age was not a significant predictor of tinnitus in the current study. We found that employment status was associated with tinnitus, with tinnitus patients being less likely to be working. The negative influence of tinnitus on concentration, compounded by sleeplessness and fatigue, may explain this difference. Comparable results were found by Holgers et al.,¹¹ who found that 22.8% of subjects had been absent from work because of their tinnitus.

Since the evaluation of personality characteristics, and the Type D personality profile, in particular, can explain why some tinnitus sufferers experience more problems than others and why some patients seek help, the examination of personality characteristics seems a relevant factor in the case history of tinnitus patients. This may support a reliable and valid risk-analysis among a group of tinnitus sufferers and create opportunities for behavioral and psychological treatment approaches.

The cause-and-effect relationship between perceived tinnitus severity and personality characteristics remains an interesting question. Two major difficulties arise in relation to this debate; first, in the current study, tinnitus was already present at the moment of consultation, and so it

was difficult to analyze any preexisting personality characteristics, levels of anxiety, depression, and other psychological symptoms. Second, given that our tinnitus patients were recruited because of their consultation of our clinic for their tinnitus, the patients were likely to be more distressed than the overall tinnitus population, which consists of an amalgam of help-seeking and non-help-seeking individuals. Therefore, our tinnitus population may not represent the tinnitus population as a whole, thus indicating that the results of our study may predominantly characterize the help-seeking tinnitus population.

In conclusion, this study found that help-seeking tinnitus patients had a tendency to be significantly more neurotic, emotionally unstable, and less extraverted than the general ENT population without tinnitus, in addition to having a significantly higher prevalence of the Type D (distressed) personality. Our consecutively-selected population of help-seeking tinnitus sufferers were more likely to be men and to be married/living with a partner, but less likely to be working, as compared with ENT patients without tinnitus. Taken together, the findings suggest that personality traits and specific sociodemographic characteristics may be used in clinical practice to distinguish patients with tinnitus from non-tinnitus patients. The Type D personality construct can be assumed as a discriminating factor between the tinnitus sufferers and general ENT patients without tinnitus. The Type D personality is independently associated with tinnitus and may help in distinguishing different groups of patients that may be prone to developing severe tinnitus with major implications for daily functioning and quality of life.

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