
1 **Categorisation of Tinnitus Severity for the Mandarin Tinnitus Questionnaire**

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10 **Keywords:**

11 Tinnitus Questionnaire, Mandarin, Severity

12 **Acronyms:** SD: sleep disturbance, TQ: Tinnitus Questionnaire, VASs: visual analogue scales.

13 AP: auditory perceptual difficulties, CD: cognitive distress, ED: emotional distress, IN:
14 intrusiveness, MTQ: Mandarin Tinnitus Questionnaire,

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1 **Abstract**

2 **Background:** The Tinnitus Questionnaire is commonly used to evaluate the psychological
3 impact of tinnitus and has been translated into Mandarin. The original English version of the
4 Tinnitus Questionnaire was translated into Mandarin (MTQ). The MTQ included not the
5 same items compared with original version. Thus, MTQ should have its own severity
6 categorization.

7 **Aims/objectives:** The objective of this research was to develop a method to categorize
8 tinnitus patients by clinical severity using scores from the Mandarin Tinnitus Questionnaire
9 (MTQ).

10 **Material and Methods:** A total of 192 participants with primary complaint of tinnitus were
11 enrolled. Cross-tabulation was used to compare two categorization approaches of tinnitus
12 severity. With the first approach, categories were assigned based purely on quartiles of MTQ
13 scores. In the second approach, severity was determined based on Ordinal logistic regression.
14 The two approaches were verified by comparing the consistency with clinical judgement.

15 **Results:** Categorization based on quartiles showed low consistency with clinical
16 assessment($\kappa=0.33$), while categorization based on ordinal logistic regression showed
17 good consistency with clinical assessment($\kappa = 0.86$).Regression-based MTQ score cut-
18 offs were <21 for no problem with tinnitus, 21-36 for mild tinnitus, 37-47 for moderate
19 tinnitus, and >47 for severe tinnitus.

20 **Conclusions and significance:** Tinnitus severity can be categorized accurately using ordinal
21 logistic regression analysis of MTQ scores.

22

23 **Keywords:** Tinnitus Questionnaire, Mandarin, Severity, categorization

24 **Acronyms:** APD: auditory perceptual difficulty; MTQ: Mandarin Tinnitus Questionnaire;

25 TFI: tinnitus functional index

26

1 INTRODUCTION

2 Tinnitus is the perception of sound, commonly described as a buzzing, humming, or ringing
3 noise, in the absence of an external source¹. It occurs in 10-15% of adults². Although it is one
4 of the most common symptoms of hearing disorders, relatively few people who experience
5 tinnitus seek medical help at ear-nose-throat or audiology clinics. According to a study by
6 Davies et al,³ only 7.1% of adults with tinnitus consult a doctor, and only 2.5% seek specialist
7 advice. This is likely due to variation in the severity of tinnitus: most people experience
8 tinnitus only occasionally and consider that it does not affect them substantially. However,
9 some people suffer persistent tinnitus, which may be severely annoying and very
10 troublesome⁴. In fact, apart from the tinnitus itself, some patients suffer from tinnitus-related
11 anxiety, depression, and insomnia. Evidence shows that just over one quarter (26.1%) of
12 adults with tinnitus report problems with anxiety,⁵ 48-60% report depression,⁶ and 76%
13 experience insomnia⁷. Perceived tinnitus severity does not appear to be influenced by age,
14 gender, or hearing status, but is related to anxiety-depressive symptoms⁸.

15
16 Tinnitus severity has been assessed using psychoacoustic measurements, structured
17 questionnaires, and open-ended approaches. Self-report measures are becoming increasingly
18 common in managing tinnitus patients and in tinnitusresearch.⁹One example is the visual
19 analogue scale, in which patients report the severity of their tinnitus by choosing a position
20 along a continuous line between two end points, where the line is divided into 5-10 equal
21 intervals. Such scales can be useful for self-rating tinnitus loudness and the annoyance it
22 causes¹⁰. However, visual analogue scales are not reliable and cannot be used to judge tinnitus
23 severity independently.

24
25 An alternative to these scales is questionnaires. A recent review identified 24 tinnitus-related
26 questionnaires¹¹. The ones most often used in clinical trials are the Tinnitus Handicap
27 Inventory (THI), the Tinnitus Questionnaire, the Tinnitus Reaction Questionnaire, and the

1 Tinnitus Handicap Questionnaire.¹¹These questionnaires assess different aspects of tinnitus
2 severity. For example, the THI quantifies the functional, emotional, and catastrophic impacts
3 of tinnitus.¹²The Tinnitus Reaction Questionnaire assesses tinnitus-associated psychological
4 distress, including general distress, interference, severity, and avoidance¹³, while the Tinnitus
5 Handicap Questionnaire focuses on the patient's hearing ability and the social consequences
6 of tinnitus.¹⁴

7
8 The Tinnitus Questionnaire was one of the first to be developed and is one of the most
9 commonly used. It is used mainly to evaluate the psychological impact of tinnitus, such as
10 depression, anxiety, insomnia, negative attitudes toward tinnitus, and interference with social
11 activities¹⁶. The Tinnitus Questionnaire has been translated into German, Spanish, French,
12 Dutch, Cantonese, and Mandarin.¹⁶The full questionnaire consists of 52 items, of which 41
13 are used in the English version to calculate subscale and total scores. The English version has
14 five subscales: (1) emotional distress (including cognitive distress, 19 items), (2) auditory
15 perceptual difficulties (APDs, 7 items), (3) intrusiveness (7 items), (4) sleep disturbance (4
16 items), and (5) somatic complaints (4 items). The responses to each item are given a score of
17 0, 1, or 2, where higher scores indicate stronger tinnitus complaints.

18
19 The numbers of items in the subscales of different language versions of the questionnaire
20 differ, reflecting different factor analyses. For example, the German version of the tinnitus
21 questionnaire has 40 items¹⁶, while the Dutch version has 38 items¹⁶. The Tinnitus
22 Questionnaire is used mainly to evaluate the psychological impact of tinnitus effects, such as
23 depression, anxiety, insomnia, negative attitudes toward tinnitus, and interference with social
24 activities.¹⁶The original English version of the questionnaire was translated into Mandarin by
25 Meng *et al.*,¹⁵ who validated it among Chinese adults and showed that there was high
26 consistency between re-tests (Spearman correlation coefficients 0.87–1.00) as well as good
27 internal consistency and reliability (overall Cronbach $\alpha = 0.93$, subscale α values = 0.71–
28 0.86). The Mandarin version of the Tinnitus Questionnaire (MTQ) has 37 items, where the

1 highest possible score is 74. The five subscales are emotional distress (11 items), APDs (8
2 items), cognitive distress (6 items), sleep disturbance (6 items), and intrusiveness (6 items).
3 Comparing with TQ, items of somatic complaints were not extracted in MTQ.

4
5 While the score on the Tinnitus Questionnaire provides insight into the severity of the
6 psychological impacts of tinnitus, it only roughly reflects the clinical severity of the disorder.
7 This is important because clinicians must determine whether patients have bothersome or
8 non-bothersome tinnitus,¹ and this classification affects subsequent intervention. Developing
9 a scale of tinnitus severity with more than these two categories may help clinicians to design
10 effective intervention plans for each patient, as well as assess whether the intervention has
11 reduced tinnitus severity.

12
13 Although using a questionnaire may be one of the most straight forward ways to assess
14 tinnitus severity,¹ no categorization of tinnitus severity has been developed for the original
15 Tinnitus Questionnaire or for the MTQ. Only the German version of the Tinnitus
16 Questionnaire, which includes a total of 42 items covering five subscales (emotional and
17 cognitive distress, intrusiveness, auditory perceptual difficulties, sleep disturbances, and
18 associated somatic complaints), has an indication for distress level based on the total score (0-
19 30 = mild, 31-46 = moderate, 47-59 = severe, 60-84 = very severe)¹⁷.

20
21 It has been proposed that this categorization system could also be used for other tinnitus-
22 related questionnaires. The original English version of the THI also categorizes the severity of
23 tinnitus into four levels based on score (0-16 = no handicap, 18-36 = mild handicap, 36-56 =
24 moderate handicap, 58-100 = severe handicap)¹². A revised version of this categorization has
25 five levels (0-16 = slight, 18-36 = mild, 38-56 = moderate, 58-76 = severe, 78-100 =
26 catastrophic)⁵. A tinnitus functional index (TFI) has been developed to assess severity, where
27 a score of <25 is mild and requires no intervention, 25-50 is significant and indicates a possible
28 need for professional attention, and >50 is severe and requires more aggressive efforts¹⁸. In

1 China, two versions of the THI categorization have been used in the clinic. A five-step TFI
2 for assessing severity has also been developed based on US respondents¹⁹(0-17= not a
3 problem,18-31 = small problem,32-53 = moderate problem,54-72 = big problem,73-100 =
4 very big problem), while a slightly different index has been developed based on UK
5 respondents²⁰(0-7 = no problem,7-28 = small problem,29-47 = moderate problem,48-65 = big
6 problem,66-100 = very big problem).

7

8 Therefore, as indicated above, TQ is useful to evaluate the psychological impact of tinnitus
9 effects. As different language versions of the tinnitus questionnaire contain different numbers
10 of items, different versions should have their own severity categorizations. The purpose of the
11 current study was to develop a categorization method for tinnitus severity based on MTQ
12 score. Accurate classification of patients may help provide new criteria for designing
13 intervention protocols and assessing treatment efficacy.

14

15 **MATERIALS AND METHODS**

16 **Participants**

17 Participants at least 18 years old were recruited from patients who sought treatment for
18 primary tinnitus at the Department of Otorhinolaryngology in the Hearing Center of West
19 China Hospital, Sichuan University. Patients with psychiatric disorders, auditory
20 hallucination, or difficulty in expressing themselves were excluded. Subjects were enrolled
21 after they provided written informed consent. Each patient underwent routine audiological
22 examination, which consisted of pure-tone audiometry followed by completion of the MTQ.
23 This research was approved by the ethics committee of West China Hospital, Sichuan
24 University.

25

26 **MTQ**

1 Participants filled out all 52 items on the full MTQ, but only 37 were analyzed in the present
2 study¹⁵. The following items from each subscale were analyzed: emotional distress, 11, 16,
3 19, 45, 35, 37, 39, 48, 43, 46, 47; APDs, 26, 15, 38, 50, 33, 2, 9, 14; cognitive distress, 41, 23,
4 42, 18, 32, 17; sleep disturbance, 20, 36, 5, 12, 52, 4; and intrusiveness, 27, 21, 3, 13, 28,
5 29.¹⁵ Three responses were possible for each item: "true" (2 points), "partly true" (1 point), or
6 "not true" (0 point), such that the maximum possible score was 74. A higher score indicated
7 more severe tinnitus.

8

9 **Categorization of tinnitus severity from MTQ data**

10 We tested two statistical approaches to classifying the clinical severity of tinnitus based on
11 MTQ data. The first approach MTQ scores were divided into quartiles, and individuals in the
12 first quartile were classified as having no problem with tinnitus, the second quartile as having
13 mild tinnitus, the third as having moderate tinnitus, and the fourth as having severe tinnitus¹².
14 Quartile is a ranked set of data. The first quartile is as the middle number between the
15 smallest number and the median of the data set. The second quartile is the median of the data.
16 The third quartile is in the middle between the median and the highest value of the data set.
17 This is the method used, for example, on the Tinnitus Handicap Inventory. As an existing
18 categories way used for identifying categories in other categorising tinnitus severity, quartile
19 analysis was used as a starting point in this analysis. In the second approach, tinnitus severity
20 was determined based on ordinal logistic regression. Patients were divided into four groups
21 based in cutoffs determined by Ordinal logistic regression.

22 The valid of creating tinnitus-distress severity categories for MTQ based on statistic method
23 was verified by comparing the method with a clinical categories based on a clinician
24 judgement, specialized in tinnitus intervention, based on clinical assessment and the patient's
25 history (including emotional and cognitive distress, APDs, sleep disturbance, and
26 intrusiveness). Patients with more complaints in these categories or more severe
27 psychological impacts associated with tinnitus were categorized as having more severe

1 tinnitus. The categories for clinical categorization were not a problem, mild, moderate and
2 severity .

3 Consistency between the two categorisation approaches was assessed.

4

5 **Data analysis**

6 Statistical analysis was performed using SPSS20.0 (IBM, Chicago, IL, USA).ROC is often
7 used as a recognized method when there is a golden standard with a cutoff point in order to
8 explore the sensitivity and specificity of an individual test. In the present study, Logistic
9 regression was chosen because there was no golden standard for categorizing tinnitus severity
10 in Tinnitus Questionnaire. Ordinal logistic regression was performed to examine the
11 correlation between clinical assessment of tinnitus severity and the MTQ score. Ordinal rather
12 than binary logistic regression was chosen because we wanted to classify tinnitus severity on
13 a four-degree scheme (not a problem, mild, moderate, severity). The dependent variable in the
14 regression was severity defined by clinical assessment, and total MTQ score was the
15 independent variable. Cohen's kappa coefficient, which was introduced in 1960, serves as the
16 most widely employed coefficient to assess inter-observer agreement for categorical
17 outcomes. Because the assessment of tinnitus severity category was ranked data, consistency
18 between the clinical assessment and regression-based severity was evaluated using the kappa
19 co-efficient.

20

21 **RESULTS**

22 A total of 192 participants with a primary complaint of tinnitus were enrolled. The average
23 age was 45years (SD=15.52 years; range = 18–83 years), and participants had tinnitus for
24 periods ranging from 3 days to 25 years (mean=26.37 months, SD=41.36 months).

25 Hearing assessments were performed in all 192 participants (Table1). For the right ear, 78
26 patients had normal hearing; 57, mild hearing loss; 38, moderate loss; 15, severe loss; and 4,

1 profound loss. This assessment was based on the grades of hearing loss defined by the World
2 Health Organization in 2006. For the left ear, 99 participants had normal hearing; 37, mild loss;
3 37, moderate loss; 16, severe loss; and 3, profound loss. Nearly all participants (181, 94.27%)
4 had continuous tinnitus, while the remaining 11 (5.73%) had intermittent tinnitus.

5 [Insert Table 1 near here]

6 **MTQ scores and two categorization analysis of tinnitus severity**

7 The mean total score was 26.63 (SD = 16.26), with a median of 23.00. The 25th percentile was
8 14.00 and the 75th percentile was 38.75. Respondents were categorized by tinnitus severity
9 based on quartiles, and further statistical analysis was performed using the mean (Table 2). All
10 four quartiles were nearly equal in size, with each accounting for 22.92-28.13% of
11 respondents.

12 [Insert Tables 2 near here]

13 We compared the number of patients in each category as determined by quartile-based
14 classification with the number of patients in each category as determined by clinical
15 classification (Table 3). For clinical classification, there were fewer patients with moderate
16 and severe tinnitus than with mild tinnitus or no problem with tinnitus. When patients were
17 categorized by clinical classification, MTQ scores ranged from 11.00 - 23.00 in patients with
18 mild tinnitus, 35.00 - 49.00 in patients with moderate tinnitus, and >49.00 for all patients with
19 severe tinnitus. The highest MTQ score in patients with no problem with tinnitus was
20 26.00. Some overlap was observed between patients with mild tinnitus or no problem with
21 tinnitus, and between patients with mild or moderate tinnitus. This likely reflects the
22 subjective nature of clinical assessment.

23

24 [Insert Table 3 near here]

25 Severity categorization agreed significantly between quartile analysis and clinical assessment
26 ($p < 0.01$), but consistency was low ($\kappa = 0.33$, Table 4). There was excellent agreement

1 between the two types of classification for patients with no problem with tinnitus (52/54,
2 96.30%). However, 30 participants categorized as having mild tinnitus based on quartile
3 analysis were categorized as having no problem with tinnitus by clinical assessment. In
4 addition, 38 participants categorized as having moderate tinnitus based on quartile analysis
5 were categorized as having severe tinnitus based on clinical assessment. Twenty-five patients
6 were categorized as having severe tinnitus using both classification methods (25/48, 52.08%);
7 however, 22 patients categorized as having severe tinnitus based on quartile analysis were
8 categorized as having moderate tinnitus based on clinical assessment.

9 [Insert Table 4 near here]

10

11 **Regression-based prediction of tinnitus severity**

12 In the second method, we used ordinal logistic regression to determine MTQ score cut-offs
13 for categorizing patients with different levels of tinnitus severity. MTQ scores ranged from 0
14 –20 for patients with no problem with tinnitus, 21 – 36 for patients with mild tinnitus, 37 -47
15 for patients with moderate tinnitus, and 49 -66 for patients with severe tinnitus, as categorized
16 by clinical assessment (Table 5). We used these values to define cut-off scores for each
17 category (no problem with tinnitus = less than 21; mild tinnitus = 21-36; moderate tinnitus
18 = 37-47; severe tinnitus = greater than 47).

19 [Insert Table 5 near here]

20 We then compared the results of the above classification method with classifications by
21 clinical assessment. There was a strong correlation between the two classification methods (p
22 < 0.01), and a high kappa value (0.86, Table 6). There were disagreements in categorizing 3
23 patients with no problem with tinnitus, 4 patients with mild tinnitus, and 1 patient with
24 moderate tinnitus. The clinical and regression-based methods agreed on categorizing 25
25 patients with severe tinnitus, with a disagreement for only 1 patient who was classified as
26 having moderate tinnitus based on clinical assessment but severe tinnitus based on regression.

1 [Insert Table 6 near here]

2 **DISCUSSION**

3 The biggest obstacle in grading tinnitus severity is the lack of any objective measure.

4 Psychometrically validated questionnaires are the most effective way of assessing tinnitus⁴.

5 Unfortunately, there is no uniform questionnaire to be accepted. The questionnaire used to

6 judge tinnitus severity should minimize some of the inaccuracy and bias inherent in

7 subjective assessment.⁴ The Tinnitus Questionnaire and THI are widely used for subjectively

8 measuring tinnitus severity.⁴ The lack of a single standard can lead to inaccuracy and bias in

9 subjective clinical assessments⁴.

10

1 Considering most of tinnitus is primary and subjective in nature, besides questionnaire
2 measurements, clinical judgement by clinicians is also an essential element before making
3 clinical decision to provide safe and effective interventions for patients with tinnitus. To
4 grade tinnitus severity by only using MTQ or statistical analysis may be misleading. It is
5 evidenced that the grade of tinnitus severity is likely not to being accepted when the statistical
6 categorizing analysis of tinnitus severity is inconsistent with clinical judgement. Similarly,
7 clinical judgement is also a subjective concept, depending on individual's knowledge, clinical
8 experience and sometimes preference. Without regulation and standardisation of structures
9 and processes, it could be biased and unreliable to grade tinnitus severity only relying on
10 individual's clinical judgement. Therefore, it seems better to combine the statistical analysis
11 and clinical judgement in terms of validity and efficacy when categorizing the tinnitus
12 severity in clinic.

13 We used two statistical approaches to grade tinnitus severity and found large discrepancies
14 between the results of categorizing participants based purely on MTQ score quartiles and the
15 results of clinical assessment based on medical records. The quartile approach assigned nearly
16 the same number of participants to each of the four categories (Table 2), while there were
17 more patients with mild tinnitus or with no problem with tinnitus using the clinical approach
18 (Table 3). This uneven distribution more closely matches what would be expected in the
19 clinic. Ordinal logistic regression assigned 26 participants (13.54%) to the group with severe
20 tinnitus and 25 (13.02%) to the group with moderate tinnitus, which is consistent with a
21 previous study showing that approximately 20% of adults who experience tinnitus require
22 clinical intervention⁵. Our results indicate that quartile-based classification does not
23 accurately reflect clinical reality. In contrast, regression-based categorization was more
24 consistent with clinical assessment.

25 Regression-based classification may be useful for identifying individuals who require clinical
26 intervention and determining whether a given intervention has been effective or not. An
27 effective treatment should, for example, reduce tinnitus severity according to the MTQ score.

1 Further work should examine how much the MTQ score needs to decrease in order to achieve
2 clinically significant improvement. The ultimate test of any categorization method is whether
3 it is sensitive enough to detect differences in therapeutic efficacy between interventions.

4 One limitation of our study is that clinical assessment of all study participants was carried out
5 by a single individual. To minimize any bias or subjectivity, we provided our clinician with
6 clear, predefined criteria as specified in Methods. However, our results may not be reflective
7 of assessment outcomes by other clinicians. Further work should be performed to verify and
8 extend this work using clinical assessments by multiple physicians. Future studies could also
9 compare the outcomes of different clinicians' assessments and patients' self-assessment on the
10 same four-point scale.

11 The MTQ categorization strategy in this study should be used, in principle, only for Chinese
12 patients because different language versions have different numbers of items. Therefore,
13 categorization methods for Tinnitus Questionnaires in other languages are still needed. The
14 total scores, items, and categories in the MTQ and German Tinnitus Questionnaire are
15 different: 42 items are included in the German version and 37 are included in the MTQ.
16 Therefore, although both versions feature four distress levels, they do not mean the same
17 thing. The German version classifies patients as having mild, moderate, severe, or very severe
18 tinnitus, while the MTQ classifies patients as having no problem with tinnitus or as having
19 mild, moderate, or severe tinnitus. Only 7.1% of adults with tinnitus consult a doctor and only
20 2.5% seek specialist advice³, even though 94% of normal individuals report some form of
21 tinnitus-like perception; therefore, we think that the category of 'no problem with tinnitus' on
22 the MTQ may be more appropriate than 'mild tinnitus' on the German version.

23 The four-level categorisation the MTQ is similar to that on the THI¹², although he revised
24 version of the THI contains five levels.⁵ Future study should explore whether a five-level
25 categorization on the MTQ is needed. It is noteworthy that no one questionnaire can assess all
26 aspects of tinnitus-related severity. Although the MTQ can capture the psychological severity
27 of emotional distress, APDs, cognitive distress, sleep disturbance, and intrusiveness, other

1 questionnaires are still needed to capture the psychological severity caused by problems or
2 interference with work, family life, social activities, or mental concentration.

3

4 **CONCLUSIONS**

5 Ordinal logistic regression provides a reliable categorization of tinnitus severity based on the
6 MTQ score. Scores were <21 for those with no problem with tinnitus, 21-36 for those with
7 mild tinnitus, 37-47 for those with moderate tinnitus, and >47 for those with severe tinnitus.
8 Our findings should be verified and extended in studies based on clinical assessments with
9 multiple physicians.

10

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14

15 **Declaration of Conflicting Interests**

16 The authors have no conflicts of interest to declare. The authors alone wrote this article and
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18

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23 diagnostic instrument in a UK clinical population. *Hearing Research*.2018;358: 74-85.

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25

1 **Table 1.** Hearing thresholds of participants

Ear	Frequency(kHz)	Mean (dBHL)	SD	Range
Right	0.5	28.49	20.52	0.00-105.00
	1	28.88	21.61	0.00-110.00
	2	29.27	22.72	-5.00-110.00
	4	33.96	25.50	0.00-115.00
	Average(0.5-4)	34.01	18.53	4.00-100.50
Left	0.5	28.52	20.55	0.00-115.00
	1	28.85	21.22	0.00-120.00
	2	29.35	23.62	-5.00-120.00
	4	35.68	26.10	0.00-120.00
	Average(0.5-4)	30.59	20.99	0.00-116.25

2

3

1 **Table 2.** Categorization of tinnitus severity based on quartile analysis of MTQ scores
2 (n=192).

Severity	N	Mean	SD	Min	Max	Percentile		
						25 th	50 th	75 th
No problem	54	9.33	3.38	0.00	14.00	7.00	10.00	12.00
Mild	44	18.91	2.75	15.00	23.00	16.00	19.00	21.75
Moderate	46	29.91	3.81	24.00	38.00	27.00	30.00	32.25
Severe	48	50.02	8.45	39.00	66.00	42.25	49.50	57.75

3

4

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1 **Table 3.** MTQ scores in patients categorized by clinical assessment (n=192).

Severity	N	Mean	SD	Min	Max	Median score in percentile		
						25 th	50 th	75 th
No problem	85	12.93	5.66	0.00	26.00	9.00	13.00	17.00
Mild	55	26.69	5.84	11.00	39.00	23.00	27.00	31.00
Moderate	27	41.56	3.41	35.00	49.00	39.00	41.00	44.00
Severe	25	56.96	5.31	49.00	66.00	51.00	57.00	61.50

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1 **Table 4.** Consistency between quartile-based or clinical assessment-based categorization of
 2 tinnitus severity.

		Category based on clinical assessment				Total
		No problem	Mild	Moderate	Severe	
Category based on quartiles	No problem	52	2	0	0	54
	Mild	30	14	0	0	44
	Moderate	3	38	5	0	46
	Severe	0	1	22	25	48
Total		85	55	27	25	192

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4 Kappa=0.33, $p=0.00$

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1 **Table 5.** Estimates of ordinal regression parameters for MTQ-based categorization of tinnitus
 2 severity

Category	N	Mean	SD	Min	Max	Median score in percentile		
						25 th	50 th	75 th
No problem	82	12.00	4.72	0.00	20.00	8.75	12.00	16.00
Mild	59	27.37	4.36	21.00	36.00	23.00	27.00	31.00
Moderate	25	41.64	2.74	37.00	47.00	39.50	41.00	44.00
Severe	26	56.65	5.43	49.00	66.00	51.00	57.00	61.25

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4 Regression-based MTQ categories: no problem, <21; mild tinnitus, 21-36; moderate tinnitus,
 5 37-47; severe tinnitus >47

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- 1 **Table 6.** Consistency between tinnitus severity categories based on clinical assessment
 2 and ordinal logistic regression of MTQ scores.

		Ordinal logistic regression				Total
		No problem	Mild	Moderate	Severe	
Clinical assessment	No problem	76	9	0	0	85
	Mild	6	48	1	0	55
	Moderate	0	2	24	1	27
	Severe	0	0	0	25	25
Total		82	59	25	26	192

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4 Kappa=0.86, $p=0.00$

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