Reliability and validity of a Korean version of the Tinnitus Primary Function Questionnaire

SCHOLARONE™
Manuscripts

1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
21
22
23
24
25
26
27
28
29
30
31
32
33
34
35
36
37
38
39
40
41
42
43
44
45
46
47
48
49
50
51
52
53
54
55
56
57
58
59
60

Reliability and validity of a Korean version of the Tinnitus Primary Function Questionnaire

Jinbae Shin[1], Sohee Heo[1], Ho-Ki Lee[2], Richard Tyler[3], In-Ki Jin[4]

[1]Department of Speech Pathology and Audiology, Graduate School, Hallym University, Chuncheon, South Korea

[2]Soree Ear Clinic, Seoul, South Korea

[3]University of Iowa Department of Otolaryngology-Head and Neck Surgery and Communication Sciences and Disorders, The University of Iowa, Iowa City, IA, USA

[4]Division of Speech Pathology and Audiology, Research Institute of Audiology and Speech Pathology, Hallym University, Chuncheon, South Korea

Corresponding author: In-Ki Jin

Postal address: Division of Speech Pathology and Audiology, Research Institute of Audiology and Speech Pathology, Hallym University, 1 Hallymdaehak-gil, Chuncheon, Gangwon-do 24252, South Korea (Email: Inkijin@gmail.com)

Additional authors' email addresses

Jinbae Shin: diplomatjb@hanmail.net

Sohee Heo: otitis_media@naver.com

Ho-Ki Lee: earclinic@hanmail.net

Richard Tyler: rich-tyler@uiowa.edu

Conflict of Interest

Funding Statement

Acknowledgments

ABSTRACT

Purpose: **The aim of this study was to evaluate the reliability and validity of a Korean**

version of the Tinnitus Primary Functional Questionnaire (K-TPFQ).

Method: A total of 79 subjects participated in the study. All participants completed the K-TPFQ,

and the Korean versions of the Pittsburg Sleep Quality Index (K-PSQI), the Beck Depression

Inventory (K-BDI), the Strait-Trait Anxiety Inventory Questionnaire (K-STAI), and the Tinnitus

Handicap Questionnaire (K-THQ).

Results: K-TPFQ exhibited good or high internal consistency and reliability (Cronbach's alpha

range 0.91–0.95, item-total correlation range 0.50–0.82). The total score derived from the items

of the K-TPFQ and its subcategories was moderately well correlated with that of questionnaires

that measure similar parameters (Pearson's correlation coefficient range 0.50–0.79).

Conclusions: Overall, the results of the present study indicate that the K-TPFQ is reliable and

valid. Therefore, the current translated version of K-TPFQ is applicable to subjects with Korean

as their first language and proves to be a useful tinnitus questionnaire.

INTRODUCTION

Tinnitus questionnaires are useful tools for measuring the reactions of tinnitus patients to their condition and have been applied in several ways for clinical use and research. They provide information on the extent or severity of the tinnitus experienced by the patient (Newman et al., 1998; Meikle et al., 2012). For example, the Tinnitus Handicap Inventory (THI) is divided into five parts that are designed to determine the extent or severity of the tinnitus experienced by the patient, via items such as slight or no handicap (score 0–16), and mild (18–36), moderate (38–56), severe (58–76), and catastrophic (78–100) handicaps (Newman et al., 1998; Baguley and Anderson, 2003). Additionally, by comparing the total scores of the questionnaire-measured pre-treatment and post-treatment, clinicians or researchers can identify the extent of reduction of a patient's reaction to tinnitus symptoms due to treatment (Tyler et al., 2012). Furthermore, several tinnitus questionnaires are designed to assess not only the overall impact of tinnitus but also the impact of specific factors of tinnitus on the patient (Kuk et al., 1990; Newman et al., 1996; Meikle et al., 2012). For example, the Tinnitus Handicap Questionnaire (THQ) includes subcategories designed to assess the impacts of three separate elements; social aspects, hearing, and the patient's view of their tinnitus condition (Kuk et al., 1990).

Most tinnitus questionnaires were developed in the English language but several questionnaires have been translated into various other languages and validated (Kim et al., 2002; Vanneste et al., 2011; Nahad et al., 2014). For example, versions of THI that have been translated into Persian (Nahad et al., 2014), Dutch (Vanneste et al., 2011), and Korean (Kim et al., 2002) have been validated. Generally, validation of a questionnaire includes measures such as **reliability and validity** (Flamme, 2001, Vanneste et al., 2011; Tyler et al., 2014). In the case of reliability, internal consistency, which represents the extent to which the total number of items

4

in a scale measure the different aspects of the same attribute, is the main consideration. In the

case of validity, construct validity, which represents how well a test measures what it is intended

to measure is generally considered. To ensure that it can be informatively applied in the target

population of language users, appropriate translation and validation of tinnitus questionnaires are

required.

Recently, Tyler et al. (2014) developed a new tinnitus questionnaire called the "Tinnitus

Primary Function Questionnaire" (TPFQ). Items of the TPFQ focus on primary disabilities that

can have secondary effects on social components, work, and quality of life. TPFQ consists of 20

items divided into four categories (five items in each category): concentration, emotion, hearing,

and sleep. Each item is rated on a scale from 0 (completely disagree) to 100 (completely agree).

The total TPFQ score is calculated by averaging the scores of all items. Therefore, TPFQ is not

only able to measure comprehensive difficulties due to tinnitus but also the degree of difficulty

associated with each subcategory, separately. A primary advantage of TPFQ is that it can

facilitate a more targeted rehabilitation guidance via consideration of the scores in each

subcategory. For example, higher (worse) scores in the sleep subcategory than in the other

subcategories indicates that a patient's tinnitus has the greatest effect on their sleep, suggesting

that rehabilitation related to sleep would yield the most benefit. **The validation process of**

TPFQ was based on reliability and construct validity (Tyler et al., 2014). For reliability, high

Cronbach's alpha values (0.81–0.94) and moderate item-total correlation coefficient values

(0.36–0.80) were reported. In terms of validity, TPFQ was moderately to highly correlated with

scores derived from questionnaires that measure similar parameters, including the THQ

(Pearson's correlation coefficient value: 0.48–0.77). **Thus, TPFQ is valid and reliable, and**

hence, is a useful questionnaire to evaluate the efficacy of clinical trials.

The primary objective of the current study was to validate a Korean version of TPFQ, K-TPFQ. Although no such questionnaire has been developed in Korea, two Korean-translated tinnitus questionnaires are available: THI (Kim et al., 2002) and THQ (Jun et al., 2015). The Korean-translated THI (K-THI) was validated by testing on 111 tinnitus patients. High internal consistencies (Cronbach alpha = 0.79–0.95) and test-retest reliabilities (r = 0.73–0.91) were reported for K-THI and its subcategories (Kim et al., 2002). The Korean-translated THQ (K-THQ) was validated by testing on 60 tinnitus patients. A high internal consistency (Cronbach alpha = 0.96) and moderate-to-high correlations with similar questionnaires, including K-THI (Pearson's correlation coefficient value: 0.34–0.84), were reported (Jun et al., 2015). Although Korean versions of the THI (Kim et al., 2002) and THQ (Jun et al., 2015)—which are useful questionnaires for measuring patients' reactions to their tinnitus condition—have been used in clinics, the use of K-TPFQ will provide additional information for effective rehabilitation planning designed to address secondary effects on social components, work, and quality of life. **In order to effectively administer K-TPFQ to native speakers of Korean language, appropriate translation and validation are required, similar to the validation of the original TPFQ in terms of reliability and validity (Tyler et al., 2014).**

The specific aims of the current study were to evaluate the reliability and validity of K-TPFQ. First, translation of TPFQ from English into Korean language was performed, resulting in K-TPFQ. The **reliability and validity** of K-TPFQ were then evaluated. If K-TPFQ is **reliable and valid**, this questionnaire can be applied as a useful tool for devising effective rehabilitation planning for Korean patients with tinnitus.

METHODS

Translation process of TPFQ

In the current study, TPFQ (Tyler at al., 2014) was translated into Korean language, resulting in K-TPFQ. The process of translating TPFQ into K-TPFQ was based on the general procedures for questionnaire translation (Harkness et al., 2004; Hall et al., 2018). Figure 1 depicts the process. First, the corresponding author of the current study acquired permission to translate TPFQ from its developer Dr. Tyler, via e-mail. Two professional translators with expertise in English to Korean language translation then translated TPFQ into Korean, independently. Three researchers and the two translators then collectively reviewed the two translated versions and compiled a putative final version by consensus. A third translator who is an English-Korean bilingual speaker then back-translated that version into English. The back-translated English version and the original TPFQ were then compared to determine whether the putative final Korean version generated by consensus accurately reflected the idioms and colloquial forms of the source language. Three researchers, including the corresponding author and the third translator confirmed that the back-translated version was highly consistent with the original version of TPFQ. To identify potential linguistic and understanding difficulties, K-TPFQ and a 5-point rating form (1 ["very difficult to understand"] to 5 ["very easy to understand"]) were then administered to five Korean patients with tinnitus (mean age 58.4 years, standard error [SE] 0.85 years, standard deviation [SD] 2.07 years; 3 males and 2 females) at an ENT clinic in Korea ("Soree Ear Clinic"). The duration of tinnitus ranged from 0.5 to 9 years, with a mean duration of 3.5 years (SE 0.82 years, SD 3.39 years). Each participant read and filled in his/her response to each item of TPFQ and rated each item based on how well it was understood. The mean rating ranges for each item were 4.2 (item No. 9) to 5.0 (item No. 1, 2, 6, 7, 8, 10, 11, 12, 19) and the mean rating range of the total TPFQ items was 4.72 (SE 0.05, SD 0.45). All

7

participants rated all items of TPFQ as either 4 ("easy to understand") or 5 ("very easy to understand"). The final version of K-TPFQ was then generated after proofreading, including spelling checks.

Participants

The participants were patients who were diagnosed with chronic tinnitus at Soree Ear Clinic between March 2015 and December 2017 and consented to participate in the current study. The total number of participants was 79 (40 females and 39 males). Information on biographical and tinnitus history was obtained via the Korean version of the Tinnitus Intake Questionnaire, which was administered in an oral interview format (Stouffer and Tyler, 1990). This questionnaire included information such as age, duration of tinnitus, perceived laterality of tinnitus, and characteristics of the participant's tinnitus sound (Table 1). All participants were also asked to rate the loudness of the tinnitus sound on a scale from 0 (very faint) to 100 (extremely loud) (Table 1). The study was approved by the institutional review board of Hallym University (HIRB-2015-04-1).

Procedure

Before administering the questionnaires, an audiologist explained the purpose and methodology of the questionnaires. All participants answered a paper-based questionnaire directly using a pen, in a quiet place (counselling room) at the ENT clinic. The audiologist was in the same room while the questionnaires were being answered by each participant and responded to any questions asked by the participants. The questionnaires were distributed in a random order.

K-TPFQ and four additional questionnaires, which were also used to validate the original

TPFQ (Tyler et al., 2014), were administered to determine the reliability and construct the

validity of K-TPFQ. The four questionnaires were also translated into Korean language and then

validated. One of the additional questionnaires was K-THQ (Kuk et al., 1990; Jun et al., 2015),

which evaluates patients' overall reactions to their tinnitus condition. Therefore, the patients'

overall reaction to the tinnitus condition based on the total score of K-THQ was compared to that

based on the total score of K-TPFQ. THQ consists of 27 items and is divided into three factors.

Factor 1 (15 items) measures physical, emotional, and social consequences of tinnitus. Factor 2

(8 items) measures the effects of tinnitus on hearing, and factor 3 (4 items) measures the

patient's view of tinnitus. Each item is responded to on a scale from 0 (strongly disagree) to 100

(strongly agree), and the total THQ score is calculated by adding the scores of factors 1, 2, and 3

and converting the result into a percentage. Although two Korean-translated tinnitus

questionnaires were available, there were two reasons why we used K-THQ for validating K-

TPFQ. First, as K-THQ results are known to be highly correlated with K-THI results (Jun et al.,

2015), the authors agreed to use only one of the two validated questionnaires, so as to reduce the

time required for assessments. Second, K-THQ is commonly used in the ENT clinic. Hence, it

was preferred over K-THI and selected to minimize the number of additional questionnaires.

Three additional questionnaires were used to validate the subcategories of K-TPFQ. One was the

Beck Depression Inventory translated into Korean (K-BDI) (Beck et al., 1961; Jo et al., 2007).

K-BDI consists of 21 items and is widely used to assess the severity of depression. Each item is

responded to with a score from 0 to 3, and the total score is calculated by adding the scores of all

items; it ranges from 0 to 63. Higher scores correspond to a greater level of depression. The

second was a Korean version of the State-Trait Anxiety Inventory (K-STAI) (Spielberger and

Gorsuch, 1983; Cho and Choi, 1989). K-STAI consists of 20 items and is generally used to

assess a patient's feelings of anxiety. Each item is responded to with a score between 1 and 4,

and the total score is calculated by adding the scores of all items, and ranges from 20 to 80.

Higher scores correspond to a greater level of trait anxiety. Lastly, the Pittsburgh Sleep Quality

Index translated into Korean (K-PSQI) was used (Buysse et al., 1989; Sohn et al., 2012).

Consisting of 24 items, K-PSQI is generally used to assess the severity of sleep disturbance. Of

the 24 items, 19 are related to the person who has sleep disturbance and the other 5 items are

related to his/her bed partner. When scoring the original PSQI (Buysse et al., 1989) and K-PSQI

(Sohn et al., 2012), only the 19 items related to the person with sleep disturbance were used, and

the other 5 items related to bed partners were used only for counselling. The current study used

the same scoring method with the original PSQI and K-PSQI. These 5 items were also omitted in

the study conducted to validate the original TPFQ (Tyler et al., 2014). The 19 items consist of 7

components: subjective sleep quality, sleep latency, sleep duration, habitual sleep efficiency,

sleep disturbances, use of sleeping medication, and daytime dysfunction. Each component

consists of 1 to 4 items and the total scores of each component range from 0 to 3. The total score

is calculated using the scores of all the components, and ranges from 0 to 21. Higher scores

correspond to greater difficulty with sleeping. The time taken to complete the five questionnaires

was around 60 to 70 minutes for each participant. A break was provided according to the

participant's requirement.

Statistical Plan

In the current study, the internal consistency of K-TPFQ was used as the reliability

measurement. All 79 participants completed K-TPFQ, then reliability was measured based on the

10

data. Internal consistencies for the 20-items and subcategories of K-TPFQ were assessed using

Cronbach's alpha. Correlations between the scores for each item and the total K-TPFQ score

were also assessed via item-total correlation coefficients. To determine whether total and

subcategory K-TPFQ scores correlated with scores derived from other questionnaires that

measure similar parameters and have been previously validated, the K-THQ, K-BDI, K-STAI,

and K-PSQI scores were compared with the total and subcategory K-TPFQ scores using

Pearson's correlation coefficient values.

RESULTS

Mean questionnaire scores

The mean total score for all the items of K-TPFQ was 40.8 (SE 2.6, SD 23.6), and mean

scores of the K-TPFQ subcategories were 37.0 (SE 3.0, SD 27.2) for the concentration scale,

52.9 (SE 3.5, SD 31.2) for the emotion scale, 29.8 (SE 3.0, SD 26.8) for the hearing scale, and

43.3 (SE 3.5, SD 31.9) for the sleep scale. With regard to questionnaires used to investigate

validity, the mean scores were 7.4 (SE 0.5, SD 4.6) for K-PSQI, 14.5 (SE 1.4, SD 12.5) for K-

BDI, 44.8 (SE 1.2, SD 11.3) for K-STAI, and 34.5 (SE 2.3, SD 20.6) for K-THQ.

Reliability

Cronbach's alpha and item-total correlation coefficients were used as measures of the

reliability of K-TPFQ. Overall, K-TPFQ exhibited good or high internal consistency reliability.

Generally, Cronbach's alpha > 0.7 is interpreted as being indicative of high internal consistency

reliability (Cronbach, 1951). With regard to the total derived from all 20 K-TPFQ items,

Cronbach's alpha was 0.95. For the four subcategories, Cronbach's alpha values were 0.92 for

the concentration scale, 0.94 for the emotion scale, 0.91 for the hearing scale, and 0.95 for the

sleep scale. The item-total correlations for K-TPFQ are shown in Table 2. Generally, an item-

total correlation > 0.5 is interpreted as being indicative of good internal consistency (Kline,

1986). The item-total correlation coefficients for all 20 items of K-TPFQ ranged from 0.50 to

0.82.

Construct validity

For construct validity measures of K-TPFQ, Pearson's correlation coefficient values

between K-TPFQ scores (total score and the four subcategory scores) and scores for the four

validity test measures were calculated (Table 3). Overall, the total items of K-TPFQ and its

subcategories were moderately well correlated with those of questionnaires that measure similar

parameters. Generally, correlations > 0.7 are considered high, those between 0.5 and 0.7 are

considered moderate, and those < 0.5 are considered low (Taylor, 1990). The score derived from

the total of the items of K-TPFQ was highly correlated with that of K-THQ ($r = 0.79$, $p < .01$),

and it was moderately correlated with those of K-PSQI ($r = 0.52$, $p < .01$), K-BDI ($r = 0.55$, p

$< .01$), and K-STAI ($r = 0.59$, $p < .01$). With regard to the K-TPFQ subcategories, the emotion

scale was highly correlated with K-THQ ($r = 0.73$, $p < .01$) and moderately correlated with K-

BDI ($r = 0.60$, $p < .01$) and K-STAI ($r = 0.65$, $p < .01$). The hearing scale was moderately

correlated with K-THQ ($r = .50$, $p < .01$). The sleep scale was highly correlated with K-PSQI (r

$= 0.75$, $p < .01$) and moderately correlated with K-THQ ($r = 0.60$, $p < .01$). The concentration

scale was highly correlated with K-THQ ($r = 0.72$, $p < .01$).

DISCUSSION

The purpose of this study was to evaluate **the reliability and validity** of K-TPFQ. K-TPFQ exhibited good or high internal consistency reliability between the items. The total items of K-TPFQ and its subcategories were moderately well correlated with those of questionnaires that measure similar parameters. Thus, the results of the current study indicate that K-TPFQ **is reliable and valid.**

The results of the K-TPFQ validation assessment were comparable to those of the original TPFQ (Tyler et al., 2014). With regard to reliability, Cronbach's alpha values ranged from 0.81 to 0.94 for the original TPFQ and from 0.91 to 0.95 for K-TPFQ. The item-total correlation values ranged from 0.36 and 0.80 for the original TPFQ and from 0.50 to 0.82 for K-TPFQ. In validity assessments, the total score and scores for the subcategories of the original TPFQ and K-TPFQ were highly correlated with the scores derived from questionnaires that measure similar parameters. Pearson's correlation coefficient values ranged from 0.48 to 0.77 for the original TPFQ and from 0.50 to 0.79 for K-TPFQ. Collectively, these results indicate that K-TPFQ is **as reliable and valid** as the original TPFQ.

Although the current study validated K-TPFQ in terms of **reliability and validity**, it does have some limitations. First, the test-retest reliability of K-TPFQ was not evaluated. Generally, test-retest measures of the questionnaire provide information on whether the participants' responses are reliable, and evaluation of these measures would render the K-TPFQ more reliable. However, the results of K-TPFQ were moderately to highly correlated with those of comparable questionnaires, indicating that the participants' responses were consistent. Second, high Cronbach alpha values (> 0.95) were observed in several cases in the current study. Sometimes, redundancy of items results in high Cronbach alpha values (Osborne and Costello, 2004). A factor analysis enables the determination of whether high Cronbach alpha values indicate

redundancy of the items of the questionnaire. For this analysis, generally, the subject-to-variables

ratio is important; a ratio > 5:1 is recommended (Osborne and Costello, 2004). However, this

ratio in the current study was 4:1 (79 subjects/20 items = 3.95). Hence, further study including

factor analysis to identify the effects of redundancy of the items of K-TPFQ is warranted.

K-TPFQ has some advantages compared to the currently available Korean-translated

tinnitus questionnaires. K-TPFQ can take less time to complete than other questionnaires. While

K-THI (Kim et al., 2002) is composed of 25 items and K-THQ (Jun et al., 2015) is composed of

27, K-TPFQ is composed of only 20 items. The lower number of items in K-TPFQ compared to

that in other questionnaires may contribute to reduction of the completion time. **In the current

study, the time to complete K-TPFQ was between 5 and 11 min (mean 7.9 min, SE 0.18

min, SD 1.68 min), whereas the time to complete K-THQ was between 6 and 17 min (mean

11.2 min, SE 0.22 min, SD 1.99 min).** Another advantage of K-TPFQ is that along with

providing information on the severity of the tinnitus symptoms experienced, it also provides

information pertaining to the relative contributions of each subcategory (concentration, emotion,

hearing, and sleep scales) to that severity, separately (Tyler et al., 2014). Therefore, the scores of

each subcategory can yield valuable information about the main type or types of rehabilitation

required, which can be utilized during the rehabilitation planning process. On the basis of the

advantages of K-TPFQ, the current translated version will be applicable to subjects with Korean

as their first language and proves to be a useful tinnitus questionnaire.

REFERENCES

Baguley, D. M., & Andersson, G. (2003). Factor analysis of the tinnitus handicap inventory.

    American Journal of Audiology, 12(1), 31–34.

Beck, A. T., Ward, C. H., Mendelson, M., Mock, J., & Erbaugh, J. (1961). An inventory for

    measuring depression. *Archives of General Psychiatry*, *4*, 561–571.

Buysse, D. J., Reynolds C. F. 3rd, Monk, T. H., Berman, S. R., & Kupfer, D. J. (1989). The

    Pittsburgh Sleep Quality Index: a new instrument for psychiatric practice and

    research. *Psychiatry Research*, *28*(2), 193–213.

Cho, S. C., & Choi, J. S. (1989). Development of the Korean form of the state-trait anxiety

    inventory for children. *Seoul J Psychiatry*, *14*(3), 150–157.

Cronbach, L. J. (1951). Coefficient alpha and the internal structure of tests. *Psychometrika,*

    16(3), 297–334.

Flamme, G. A. (2001). Examination of the validity of auditory traits and tests. *Trends in*

    Amplification, *5*(3), 111–138.

Harkness, J. A., Pennell, B., & Schoua-Glusber, A. (2004). Survey questionnaire translation and

    assessment. In S. Presser, J. Rothgeb, M. Couper, J. Lessler, E. Mertin, J. Martin, et al.

    (Eds.), *Methods for Testing and Evaluating Survey Questionnaires* (pp. 453–473).

    Hoboken, NJ: John Wiley and Sons.

Jo, S. A., Park, M. H., Jo, I., Ryu, S. H., & Han, C. (2007). Usefulness of Beck Depression

    Inventory (BDI) in the Korean elderly population. *International Journal of Geriatric*

    Psychiatry, *22*(3), 218–223.

Jun, H. J., Yoo, I. W., Hwang, S. J., & Hwang, S. Y. (2015). Validation of a Korean version of

    the Tinnitus Handicap Questionnaire. *Clinical and Experimental*

Otorhinolaryngology, *8*(3), 198–201.

Kim, J. H., Lee, S. Y., Kim, C. H., Lim, S. L., Shin, J. N., Chung, W. H., ... & Hong, S. H.
(2002). Reliability and validity of a Korean adaptation of the Tinnitus Handicap
Inventory. *Korean Journal of Otorhinolaryngology-Head and Neck Surgery*, *45*(4), 328–
334.

Kline P. (1986). *A Handbook of Test Construction: Introduction to Psychometric Design*. (pp.
118–132). New York, NY: Methuen & Co.

Kuk, F. K., Tyler, R. S., Russell, D., & Jordan, H. (1990). The psychometric properties of a
tinnitus handicap questionnaire. *Ear and Hearing*, *11*(6), 434–445.

Meikle, M. B., Henry, J. A., Griest, S. E., Stewart, B. J., Abrams, H. B., McArdle, R., ... &
Vernon, J. A. (2012). The tinnitus functional index: development of a new clinical
measure for chronic, intrusive tinnitus. *Ear and Hearing, 33*(2), 153–176.

Nahad, H. A., Rouzbahani, M., Jarollahi, F., Jalaie, S., Pourbakht, A., Mokrian, H., ... & Nodin
Zadeh, A. (2014). Translation, validity, and reliability of a persian version of the iowa
tinnitus handicap questionnaire. *Iranian Journal of Otorhinolaryngology*, *26*(75), 79–88.

Newman, C. W., Jacobson, G. P., & Spitzer, J. B. (1996). Development of the Tinnitus Handicap
Inventory. *Archives of Otolaryngology—Head & Neck Surgery*, *122*(2), 143–148.

Newman, C. W., Sandridge, S. A., & Jacobson, G. P. (1998). Psychometric adequacy of the
Tinnitus Handicap Inventory (THI) for evaluating treatment outcome. *Journal of the
American Academy of Audiology, 9*(2), 153–160.

Osborne, J. W., & Costello, A. B. (2004). Sample size and subject to item ratio in principal
components analysis. *Practical assessment, research & evaluation*, *9*(11), 8.

Sohn, S. I., Kim, D. H., Lee, M. Y., & Cho, Y. W. (2012). The reliability and validity of the

Korean version of the Pittsburgh Sleep Quality Index. *Sleep & Breathing*, *16*(3), 803–812.

Spielberger, C. D., & Gorsuch, R. L. (1983). *Manual for the State-Trait Anxiety Inventory (Form Y)*. Palo Alto, CA: Consulting Psychologists Press.

Stouffer, J. L., & Tyler, R. S. (1990). Characterization of tinnitus by tinnitus patients. *The Journal of Speech and Hearing Disorders*, *55*(3), 439–453.

Taylor, R. (1990). Interpretation of the correlation coefficient: a basic review. *Journal of Diagnostic Medical Sonography*, *6*(1), 35–39.

Tyler, R. S., Noble, W., Coelho, C. B., & Ji, H. (2012). Tinnitus retraining therapy: mixing point and total masking are equally effective. *Ear and Hearing*, *33*(5), 588–594.

Tyler, R., Ji, H., Perreau, A., Witt, S., Noble, W., & Coelho, C. (2014). Development and validation of the tinnitus primary function questionnaire. *American Journal of Audiology*, *23*(3), 260–272.

Vanneste, S., To, W. T., & De Ridder, D. (2011). The psychometric properties of the Tinnitus Handicap Questionnaire in a Dutch-speaking population. *Clinical Otolaryngology*, *36*(1), 9–16.

Hall, D. A., Zaragoza Domingo, S., Hamdache, L. Z., Manchaiah, V., Thammaiah, S., Evans, C., Wong, L. L. N., & International Collegium of Rehabilitative Audiology and TINnitus Research NETwork. (2018). A good practice guide for translating and adapting hearing-related questionnaires for different languages and cultures. *International Journal of Audiology*, *57*(3), 161-175.

Tables

Table 1. Basic age, duration, loudness rating, perceived laterality of tinnitus, and characteristics of tinnitus sound data (*n* = 79)

Variable	Male	Female	All
	Mean (SE, SD)	Mean (SE, SD)	Mean (SE, SD)
Age (years)	52.0 (2.1, 13.1)	54.3 (1.4, 9.1)	53.1 (1.2, 11.2)
Duration (years)	2.3 (0.6, 4.0)	2.8 (0.6, 4.0)	2.6 (0.4, 4.0)
Loudness rating	76 (3.7, 23.6)	83 (3.3, 21.0)	78 (2.5, 22.3)

Note 1. Perceived laterality of tinnitus: right only 25.3%; left only 36.7%; binaural 38.0%.

Note 2. Characteristics of tinnitus sound: whistling 35.4%; buzzing 19.0%; beep 34.2%;

cicadas 8.9%; machine 2.5%

SE, standard error; SD: standard deviation

Table 2. Item-total correlation coefficients for K-TPFQ (*n* = 79).

Item number	Item-total correlation
1	.78
2	.54
3	.72
4	.82
5	.72
6	.56
7	.73
8	.78
9	.50
10	.80
11	.70
12	.55
13	.70
14	.57
15	.71
16	.75
17	.57
18	.69
19	.59
20	.73

Table 3. Pearson correlation coefficients derived from scores for K-TPFQ (total score and the four subcategory scores) and scores for the four validity test measures. Correlations between questionnaires that measure similar parameters are shown in bold. For all corrections, $n = 79$.

Variable	K-PSQI	K-BDI	K-STAI	K-THQ
Total				
r	**.52**	**.55**	**.59**	**.79**
p	< .01	< .01	< .01	< .01
Emotion				
r	.45	**.60**	**.65**	**.73**
p	< .01	< .01	< .01	< .01
Hearing				
r	.12	.29	.30	**.50**
p	.26	< .01	< .01	< .01
Sleep				
r	**.75**	.43	.49	**.60**
p	< .01	< .01	< .01	< .01
Concentration				
r	.27	.43	.44	**.72**
p	.01	< .01	< .01	< .01

1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
21
22
23
24
25
26
27
28
29
30
31
32
33
34
35
36
37
38
39
40
41
42
43
44
45
46
47
48
49
50
51
52
53
54
55
56
57
58
59
60

Figure legends

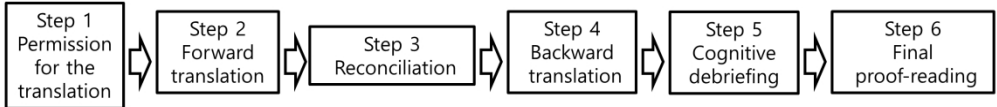Figure 1. Translation procedure used to generate K-TPFQ

Appendix A

Korean version of the Tinnitus Primary Function Questionnaire (K-TPFQ).

각 설문지에 대해 '전혀 그렇지 않다'는 0점으로, '매우 그렇다'는 100점으로, 그 중간은 0에서 100점 사이 점수로 표시해 주십시오.

Item NO.	집중 (Concentration)	Score
3	한 번에 여러 일들이 일어나는 경우에, 이 중 가장 중요한 일을 처리하는데 이명이 방해를 한다.	
7	이명 때문에 내 업무에 집중하는 것이 어렵다고 느낀다.	
11	이명으로 인해 중요한 일들에 주의를 집중하기 어렵다.	
15	이명이 나에게 미치는 최악의 영향 중 하나는 이명으로 인해 생각에 집중하지 못한다는 점이다.	
19	나는 이명으로 인해 조용한 공간에서 책을 읽을 때 집중하는 데 어려움을 느낀다.	
	감정 (Emotion)	
1	이명 때문에 짜증난다.	
4	이명은 마음의 평온을 깨뜨리는 최악의 요인 중 하나이다.	
8	나는 이명 때문에 우울하다.	
10	나는 이명 때문에 괴롭다.	
12	나는 그저 이명이 사라졌으면 한다. 이명은 좌절감을 크게 안겨준다.	
	듣기 능력 (Hearing)	
2	이명 때문에 잘 들리지 않는 말소리가 있다.	
6	소리를 듣는데 있어서 이명은 청력손실보다 더 안 좋은 영향을 미친다.	
9	노래와 음악 감상을 방해하는 것은 청력손실 때문이 아니라 이명 때문이다.	
14	청력 손실과 더불어 이명은 말소리를 이해하기 어렵게 방해한다.	
17	이명이 나에게 미치는 최악의 영향 중 하나는 청력손실(난청)보다 이명으로 인해 말소리를 듣기 더 어렵다는 점이다.	
	수면 (Sleep)	
5	이명 때문에 밤에 잠들기 힘들다.	
13	수면을 취하는 것에 대한 어려움은 내 이명의 최악의 영향 중 하나이다.	
16	이명으로 인한 수면 방해 때문에 하루 종일 피곤함을 느낀다.	
18	이명 때문에 밤새 잠을 이루지 못한다.	
20	밤중에 잠에서 깼을 때, 이명 때문에 다시 잠을 이루기가 힘들다.	

1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
21
22
23
24
25
26
27
28
29
30
31
32
33
34
35
36
37
38
39
40
41
42
43
44
45
46
47
48
49
50
51
52
53
54
55
56
57
58
59
60

| Step 1 Permission for the translation | ⇨ | Step 2 Forward translation | ⇨ | Step 3 Reconciliation | ⇨ | Step 4 Backward translation | ⇨ | Step 5 Cognitive debriefing | ⇨ | Step 6 Final proof-reading |

Translation procedure used to generate K-TPFQ

250x32mm (300 x 300 DPI)