

## **International Outcome Inventory for Hearing Aids (IOI-HA) translation into isiXhosa**

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Dear Editor

The most common treatment for hearing loss is hearing aids (Brodie et al., 2018). Once fitted, establishing whether hearing aid(s) have positive outcomes for the user is essential. Hearing aid benefit and satisfaction can be measured through self-reported outcome measures, which determine user perceptions based on real-world listening situations (Cox, 2003; Knudsen et al., 2012; Taylor, 2007). Standardized self-report outcome measures are particularly beneficial as the reliability and validity of the tool have been determined, and normative data is available, allowing for comparison (Boynton & Greenhalgh, 2004; Cox, 2003). Standardized versions of outcome measures are usually developed in widely spoken languages, such as English. It is, therefore, necessary to translate and adapt these measures to other languages.

The International Outcome Inventory for Hearing Aids (IOI-HA) is a standardized tool for obtaining hearing aid outcomes across several dimensions, including hearing aid use, benefit, and satisfaction (Cox & Alexander, 2002). Currently, several translations of the IOI-HA are available, but no standardized translations in any African languages (International Collegium of Rehabilitative Audiology, 2017). The lack of African translations is concerning from a representative perspective, as approximately 39.9 million persons in Africa have a moderate or higher grade of hearing loss (World Health Organization, 2021). This prevalence rate is expected to proliferate (World Health Organization, 2021). The World Health Organization has called for global action to implement and scale detection and treatment of hearing loss

(World Health Organization, 2021). This also requires appropriate standardized outcome measures to demonstrate the effectiveness of treatments.

IsiXhosa is the second most-spoken language in South Africa, with more than 8 million (16% of population) first-language speakers and eleven million additional language speakers (Statistics South Africa, 2011). Furthermore, isiXhosa is the first and second most spoken home language, respectively, in South Africa's Eastern Cape and Western Cape provinces (Statistics South Africa, 2016a, 2016b). It is also an official language in Zimbabwe (Zimbabwe Constitution, 2013). An isiXhosa IOI-HA will be beneficial for evaluating hearing aid outcomes in isiXhosa-speaking communities. An isiXhosa IOI-HA will also benefit clinical trials on hearing aids in this population. We present a translated version of the IOI-HA in isiXhosa according to current recommendations (Hall et al., 2018).

## **Method**

Ethical approval was granted by the Research Ethics Committee, Faculty of Humanities, University of Pretoria (HUM030/0621).

### ***Translation***

A recommended practice guideline for translation and adaptation was followed (Hall et al., 2018)(Supplementary material I). This guideline includes six steps: i) preparation, ii) forward translation, iii) back-translation, iv) committee review, v) field testing, and vi) reviewing and finalizing translation. A checklist is provided in supplementary material II. Additionally, pilot testing was conducted after translation was finalized. Factor structure, internal consistency, discriminant validity, and floor and ceiling effects were conducted to determine exploratory statistics on the psychometric properties of the translation.

## ***Participants***

For field testing, ten isiXhosa-speaking adults (70% were females) with hearing loss, previously identified through a community-based hearing assessment by community healthcare workers (CHWs), were recruited using purposive sampling. Participants were community members in Khayelitsha, a township in the Western Cape, South Africa. Participant ages ranged from 34 to 67 years, with a mean age of 55.7 (SD 10.7). All participants' hearing losses ranged from mild to moderate.

During pilot testing, 18 isiXhosa-speaking adults (78% were females) with hearing loss, previously fitted bilaterally with behind-the-ear hearing aids through a community-based hearing assessment by CHWs, were recruited using purposive sampling. Participants were community members in Khayelitsha, a township in the Western Cape, South Africa. Participant ages ranged from 48 to 96 years, with a mean age of 72.6 (SD 12.8). All participants' hearing losses ranged from mild to moderately severe. Participants were first-time hearing aid users for 45 days before pilot testing. Field and pilot testing were conducted at participants' homes from April to May 2021. All participants signed informed consent forms before data collection commenced.

## **Results**

### ***1. Preparation***

A literature search on three databases (Scopus, PubMed, and Web of Science) showed no isiXhosa version existed. The original English IOI-HA developed by Cox and Alexander (2002) is available on two websites, the Hearing Aid Research Lab (HARL) and the International Collegium of Rehabilitative Audiology (ICRA), for use and translation. The source-language questionnaire developer and ICRA were emailed to inform of intent to

translate. Key objectives were identified, and templates for translation recording were created. The key concepts were not defined as individuals involved in the translation procedure were fluent in English, and three were familiar with the concepts used.

## ***2. Forward translation***

Two CHWs employed by the hearX Foundation who were fluent in English (requirement for NGO employment), whose first language is isiXhosa, and resided in the community were recruited. A professional translator was not involved owing to time constraints and having CHWs with experience in isiXhosa translations available as suitable substitutes. CHWs had two years' experience conducting childhood hearing screenings and received training on adult hearing screening. CHWs were provided with the original questionnaire and explained goal of translation. The CHWs each read every question independently, and then, in addition, each question was read aloud and explained to CHWs to ensure clarity. Working independently, each CHW produced a forward translation in isiXhosa. The CHWs compared their isiXhosa versions and noted minor differences in word choice and sentence structure. The CHWs combined their translated versions and developed one consolidated forward translation in isiXhosa.

## ***3. Back-translation***

A professional isiXhosa linguist who is an in-country resident and employed at the South African Centre for Digital Language Resources (SADiLaR) and was therefore required to be fluent in isiXhosa, as well as English, was recruited. The linguist produced a back-translation from isiXhosa into English. The linguist made edits to improve the isiXhosa translation based on the back-translation.

#### ***4. Committee review***

The linguist previously recruited in step three and an audiologist who is an in-country resident, speaks isiXhosa as their home language, and is fluent in English were recruited for the committee review. The audiologist also had experience with the target population, i.e., isiXhosa-speaking individuals with hearing loss. Each translator reviewed the forward and back translations and compared these to the original questionnaire. Edits were made to improve the isiXhosa translation. No cultural adaptations were necessary. The committee agreed upon a final isiXhosa version with no discrepancies.

#### ***5. Field testing***

Ten isiXhosa-speaking individuals were recruited to determine if translation was equivalent, acceptable, and comparable to original. Participants read the isiXhosa questions aloud to the CHWs and explained in their own words what each question asked. If the participants could not read, the CHWs read the isiXhosa questions aloud to them, and the participants then explained in their own words what each question asked. If the participants' explanation of the isiXhosa version did not match the original questionnaire (as assessed by CHWs), participants were asked how the isiXhosa translation could be improved. All ten participants' explanations of the isiXhosa questions matched the original English questions as judged by the CHWs. All participants perceived the questions as clear and easy to understand. No participants recommended any changes to improve clarity. Half of the participants (n=5) completed the isiXhosa version independently, and the remaining participants (n=5) completed the questionnaire verbally in an interview format with the CHWs (due to dexterity difficulties or unable to read and/or write). The mean time taken to complete the isiXhosa version independently was 7.6 minutes (range 5 – 12 minutes) and 7.2 minutes (range 5 – 10 minutes) for the remaining participants who required assistance from CHWs.

## ***6. Reviewing and finalizing translation***

Field testing indicated that the isiXhosa translation was representative of the English original. The isiXhosa translation was sent to the source-language questionnaire developer (to date, no response received). An isiXhosa version of the IOI-HA was developed and is made available herewith (Supplemental material III).

## ***7. Pilot testing***

### *Factor structure*

A principal components analysis (PCA) was conducted. The correlation matrix determined that all variables had at least one correlation coefficient greater than 0.3 and overall Kaiser-Meyer-Olkin measure was 0.75. Bartlett's test of sphericity was statistically significant ( $p < .001$ ), indicating the data was likely factorizable. PCA revealed two components with eigenvalues greater than one and explained 51.9% and 22.5% of the total variance, respectively. Visual inspection of the scree plot indicated two components should be retained (Cattell, 1966). A two-component solution met the interpretability criterion, and two components were retained. The two-component solution explained 74.4% of total variance.

### *Internal consistency (reliability)*

The isiXhosa translation had a high level of internal consistency, as determined by a Cronbach's alpha of 0.764.

### *Discriminant validity*

The correlations between Spearman's and IOI-HA items ranged from 0.48 to 0.85 (Supplementary material I). Only four correlations were above 0.7 (i.e., moderate correlation), suggesting good discriminant validity.

### *Floor and ceiling effects*

5.6% and 11.1% of participants achieved lowest or highest total scores, respectively. As this is below the 15% threshold criteria (Terwee et al., 2007; Terwee et al., 2012), the translated IOI-HA is not characterized to have problems with floor or ceiling effects.

### **Discussion**

A isiXhosa translation of the IOI-HA was developed according to prescribed translation guidelines (Hall et al., 2018) and evaluated in a field study. The isiXhosa translation was acceptable, accessible, and equivalent in terms of wording and meaning compared to the original English questionnaire (Supplementary material III).

The translation process did present some limitations. Translation guidelines recommend that key concepts of the questionnaire be defined and provided to the translators before the translation process commences. However, as all translators were fluent in English and the CHWs and audiologist involved in translation were familiar with hearing and hearing aid related terms, key concept definitions were deemed unnecessary as agreed upon by the researchers and the CHWs. The CHWs were not included in the committee review of this translation as this was not stipulated in the translation guidelines. However, future translations should consider including all translators in the committee review process due to their knowledge of the language and dialect. The readability of the isiXhosa translation was not determined as there are currently no standardized isiXhosa readability tools. Future research should consider determining the readability scores of the translation. While the initial psychometric properties determined in this study supported the tool's validity, a larger sample size is recommended for comprehensive validation (Manchaiah et al., 2021). Since IOI-HA results are ordinal and not continuous, reporting the median scores of each item and total scores



for the overall scores may be more appropriate than commonly used mean scores (Leijon et al., 2021). Future research should consider using non-parametric statistical analysis. Standardized guidelines such as the COSMIN taxonomy for measurement properties should be considered to evaluate psychometric properties such as factor-structure analysis, internal consistency, test-retest reliability, construct validity, discriminant validity, and floor/ceiling effects (Manchaiah et al., 2021; Terwee et al., 2007; Terwee et al., 2012). These psychometric properties should be compared to the original English version (Cox et al., 2002). Furthermore, future studies should consider using more contextual approaches to translating standardized tools (Chidlow et al., 2014).

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(Cattell, 1966)

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- (Cattell, 1966)