



## Original Article

## Translation and Adaptation of the Auditory Behavior in Everyday Life (ABEL) Questionnaire into Persian: A Pilot Study

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### ABSTRACT

**Background:** Auditory rehabilitation is one of the important tasks of speech-language pathologists. So, it is necessary to know auditory behaviors in order to make some decisions about the children with hearing loss such as determining the effectiveness of the current rehabilitation programs and/or devices. The Auditory Behavior in Everyday Life (ABEL) questionnaire is a valid and reliable assessment tool in English which is developed by Purdy et al. (1995). The aim of this study was to translate and adapt ABEL questionnaire for Persian language.

**Methods:** The ABEL consists of three factors of auditory-oral, auditory awareness, and conversational/social skills. First, the questionnaire was translated and culturally adapted from English to Persian by an independent Iranian translator. The back translated version was compared with the original one in terms of the semantic/idiomatic equivalence. Then the questionnaire was completed two times by 43 mothers of 4-to-6 year old children with hearing loss who were using either hearing aids or cochlear implants. Finally, the results of the test-retest reliability were statistically compared in order to assess internal consistency. The statistical tests which were used include Cronbach's Alpha, Spearman correlation, and Pearson correlation tests in significance level of 0.05.

**Results:** There was a significant strength correlation among the items of the factor 1 (Alpha=0.94), factor 2 (Alpha=0.86), factor 3 (Alpha=0.82) and three factors (Alpha=0.96). There was a significant strength correlation at the 0.01 level between the scores of each factor in test-retest include auditory-oral (Spearman's rho=0.94, P<0.001), auditory awareness (Spearman's rho=0.92, P<0.001), and conversational/social skills (Spearman's rho=0.82, P<0.001).

**Conclusion:** The Persian version of ABEL questionnaire is a valid and reliable tool for the assessment of auditory performance development in Persian-speaking children wearing hearing aids or cochlear implants. So, the ABEL questionnaire can be applied by parents/caregivers, clinicians, and researchers in order to appraise children's auditory behaviors in everyday living.

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### Introduction

Children acquire the auditory and spoken language

skills through the first few years of their life [1]. Indeed, auditory and speech behaviors are obtained due to the normal hearing [2]. Consequently, if a child suffers from hearing impairment, his /her auditory and oral language development is delayed, and he/she could not show appropriate auditory and speech behaviors in

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daily living [3]. One of the important tasks of speech-language pathologists is auditory rehabilitation [2]. Therefore, it is necessary to know auditory behaviors in order to make some important decisions about the child with hearing loss including “choosing suitable hearing instruments, identifying areas requiring greatest auditory training effort, determining effectiveness of the current rehabilitation program and/or device, and evaluating the appropriateness of educational placement” [4]. There are a few standardized measurement tools available for assessing such auditory skills in Persian children with hearing loss include categorization of auditory performance II (CAPII), Auditory Perception Test for Hearing-Impaired (APT/HI), Tavana, and Newsha. Indeed, none of these measurement tools are questionnaire. CAPII is a rating scale which included 9 categories of auditory performance as yes/no items [5]. APT/HI and Tavana are both closed-set test which are used in a structured environment [6, 7] and Newsha is a developmental scale which audition is one of its seven areas [8, 9]. So, they should be administered by an expert person such as a clinician. Therefore, it is necessary to have a questionnaire in order to evaluate specifically auditory development of Persian children by a parent/caregiver in an unstructured environment. The Auditory Behavior in Everyday Life (ABEL) questionnaire is a valid and reliable assessment tool in English. The questionnaire was first developed by Purdy et al. (1995) in order to measure auditory performance in children using cochlear implants in New Zealand [10]. It is a quick and simple questionnaire for parents to complete without assistance to evaluate their perceptions of gains in everyday auditory behavior of their child with hearing loss (age 4-14 years). The questionnaire includes three factors: auditory-oral, auditory awareness, and social/conversational skills. The overall reliability of the questionnaire is 0.94 (Cronbach’s alpha). Generally, the ABEL questionnaire can be used to assess auditory behaviors in children with hearing impairment [4]. Freitas de Souza et al. (2011) have translated and adapted the ABEL questionnaire into Brazilian Portuguese. They concluded that the questionnaire is an efficient tool to assess the development of auditory behaviors in children with hearing loss [11].

Given the need to have such a tool for assessing auditory development of Persian children with hearing loss, the aims of this study were: 1) to translate and adapt the ABEL questionnaire into Persian, 2) to determine the reliability and factor structure of the Persian version of the questionnaire, and 3) to conduct a pilot investigation in a small group of children with hearing loss in order to (a) compare outcomes for children with and without CIs, and (b) compare outcomes for children aged 4 to 6 years old.

## Methods

This study was conducted as a cross-sectional, observational study for adapting the ABEL questionnaire for Persian children with hearing loss. In general, the ABEL consists of three factors include auditory-oral (11 items), auditory awareness (10 items), and conversational/social skills (5 items). So, it includes 26 items totally. Each item is scored based on a seven point Likert scale. The total score is calculated by the outcome of dividing the sum of the items’ scores by 26. The average time of administration is about 20 minutes. In the first step, the questionnaire was translated and culturally adapted from English to Persian by an independent Iranian translator. The Persian version was back translated to English by a speech-language pathologist who was unaware of the original questionnaire. The back translated version was compared with the original one by the author of the ABEL, Professor Suzanne C. Purdy, about the semantic/idiomatic equivalence. In the second step, the reliability of the Persian version of the ABEL was examined on some clients of Soroush Rehabilitation Centre for Persian-speaking children with hearing loss in Shiraz, Iran. For this aim, the questionnaire was completed two times by 43 mothers of 4-to-6 year old children with hearing loss using hearing aids or cochlear implant. The test-retest was conducted with a 10 days interval. Finally, the results of the test-retest were statistically compared in order to assess internal consistency. The statistical tests which were used include Cronbach’s Alpha and Spearman correlation tests in significance level of 0.05. The IBM SPSS statistics 21 was used to analyze the data.

Prior to the study, the legal guardian of the children read and signed to consent form approved by the Ethics Committee of Shiraz University of Medical Sciences.

## Results

Table 1 shows the distribution of the children with hearing loss based on two variables of amplification device and Severity of hearing loss.

Table 2 shows the distribution of the children with hearing loss based on three other variables include age, age of fitting/implant, and Duration of using HA/CI.

### Factor Analysis

#### Total Correlation if Item Deleted

Table 3 illustrates the mean and standard deviation of the items of three factors. Also, the total correlation of the questionnaire (Cronbach’s Alpha) if each item was deleted has been shown in the table.

#### Inter-Item Correlation

Table 4 illustrates the Cronbach’s Alpha of inter-item

**Table 1:** The distribution of the children based on amplification device and Severity of hearing loss

Amplification device		Severity of hearing loss			
HA*	CI*	Moderate	Moderate-Severe	Severe	Severe-Profound
18	25	2	4	7	5

\*Hearing aid; \*Cochlear implant

**Table 2:** The demographic information of the children with hearing loss

Variables	Min	Max	Mean±SD*
Age (month)	16	92	53.60±19.36
Age of fitting/implant (month)	4	72	32.56±15.58
Duration of using HA*/CI* (month)	2	53	21.04±11.39

\*Hearing aid; \*Cochlear implant; \*Standard deviation

**Table 3:** The mean and standard deviation of the items of the three factors

Factors	Items	Mean±SD	deleted Item	Cronbach's Alpha
Auditory-oral	1	3.76±2.17	1	0.93
	2	3.69±2.14	2	0.93
	3	2.19±2.26	3	0.93
	4	3.02±2.22	4	0.92
	5	3.90±1.89	5	0.93
	6	3.19±1.95	6	0.93
	7	2.05±2.10	7	0.93
	8	4.40±2.00	8	0.93
	9	3.80±2.24	9	0.93
	10	3.78±2.02	10	0.94
	11	3.31±1.99	11	0.93
Auditory awareness	1	2.85±2.31	1	0.84
	2	4.30±2.05	2	0.85
	3	4.55±1.71	3	0.85
	4	2.80±1.88	4	0.85
	5	3.75±2.19	5	0.85
	6	4.90±1.58	6	0.85
	7	5.07±1.25	7	0.86
	8	3.37±1.97	8	0.85
	9	4.32±1.82	9	0.87
	10	3.47±1.96	10	0.85
Conversational/social skills	1	2.44±2.01	1	0.75
	2	1.97±1.87	2	0.75
	3	3.18±2.07	3	0.78
	4	3.35±1.92	4	0.86
	5	3.30±1.84	5	0.74

correlation of three factors. There was a significant strength correlation among the items of the factor 1 (Alpha=0.94), factor 2 (Alpha=0.86), factor 3 (Alpha=0.82) and three factors (Alpha=0.82).

#### Inter-Factor Correlation

The mean, minimum, maximum, and standard deviation of the three factors include auditory-oral (factor 1), auditory awareness (factor 2), and conversational/social skills (factor 3) which resulted from the test-retest is shown in table 5. There was a significant strength correlation at the 0.01 level between the scores of each factor in test-retest include auditory-oral (Spearman's rho=0.94, P<0.001), auditory awareness (Spearman's rho=0.92, P<0.001), and conversational/social skills (Spearman's rho=0.82, P<0.001). Also, a significant strength correlation was observed between the sums (factor 1+factor 2+factor 3) of test with sums of retest (Spearman's rho=0.96, P<0.001).

#### Intra-Factor Correlation

There was a significant strength correlation between the scores of factors in each administration time include factor 1 & factor 2 (Spearman's rho=0.91, P<0.001), factor 1 & factor 3 (Spearman's rho=0.92, P<0.001), and factor

2 & factor 3 (Spearman's rho=0.87, P<0.001).

#### Correlation between ABEL Scores and Independent Variables

There was a significant correlation between the total scores of the ABEL questionnaire with age (Pearson coefficient=0.43, P<0.001) and duration of using HA/CI (Pearson coefficient=0.52, P<0.001) in the children. However, there was no significant correlation between the total scores of the questionnaire and the type of amplification device (Has/CIs) (Spearman's rho=0.10, P>0.05), severity of hearing loss (Pearson coefficient=0.21, P>0.05) and age of fitting/implant (Pearson coefficient=0.35, P>0.05) in the children.

#### Discussion

##### Translation and Adaptation of the ABEL Questionnaire into Persian

Regarding the translation and adaptation of the ABEL questionnaire into Persian, there was consistency between the original, back-translated and the final questionnaire versions. Nonetheless, there were a few problems. The most important one was the 7-points Likert scale. Although, there are equivalents of English

**Table 4:** The Cronbach's Alpha of inter-item correlation of three factors

Factors	Items	1	2	3	4	5	6	7	8	9	10	11
Auditory-oral	1		0.71	0.60	0.63	0.53	0.64	0.54	0.65	0.46	0.45	0.42
	2			0.65	0.77	0.51	0.58	0.55	0.67	0.43	0.38	0.57
	3				0.75	0.36	0.52	0.73	0.45	0.54	0.44	0.58
	4					0.47	0.66	0.77	0.70	0.61	0.49	0.60
	5						0.67	0.39	0.74	0.67	0.39	0.51
	6							0.62	0.75	0.66	0.51	0.63
	7								0.58	0.56	0.58	0.56
	8									0.73	0.42	0.56
	9										0.43	0.44
	10											0.40
	11											
Auditory awareness	Items	1	2	3	4	5	6	7	8	9	10	
	1		0.62	0.40	0.54	0.63	0.28	0.18	0.58	0.36	0.29	
	2			0.75	0.46	0.49	0.44	0.36	0.46	0.24	0.39	
	3				0.47	0.42	0.43	0.39	0.32	0.33	0.45	
	4					0.46	0.43	0.37	0.59	0.32	0.29	
	5						0.40	0.27	0.30	0.18	0.54	
	6							0.67	0.38	0.25	0.64	
	7								0.29	0.26	0.43	
	8									0.49	0.20	
	9										0.31	
10												
Conversational/social skills	Items	1	2	3	4	5						
	1		0.64	0.65	0.27	0.57						
	2			0.55	0.31	0.57						
	3				0.11	0.59						
	4					0.41						
5												

**Table 5:** The mean, min, max, and standard deviation of three factors

Factors	Min	Max	Mean±SD
Auditory-oral <sup>1</sup>	9	66	36.72±18.02
Auditory-oral <sup>2</sup>	9	66	38.79±17.64
Auditory awareness <sup>1</sup>	13	60	38.93±12.56
Auditory awareness <sup>2</sup>	7	60	39.35±13.22
Conversational/social skills <sup>1</sup>	1	29	14.25±7.41
Conversational/social skills <sup>2</sup>	1	30	15.30±7.27
Sum <sup>1</sup>	23	153	89.90±36.90
Sum <sup>2</sup>	21	156	93.44±36.66

<sup>1</sup>Test, <sup>2</sup>Retest

words such as hardly ever, occasionally, frequently, and almost always in Persian, it is difficult to differentiate practically between hardly ever and occasionally, and also between frequently and almost always in Persian culture; In other word, the meaning of these paired words are nearly the same in Persian. So, it is recommended that one of each pair being selected for the Persian version of the questionnaire to avoid confusion. Consequently, the Persian version will have a 5-point Likert scale. The other problem was related to the questions 9 (asks about sounds heard around him/her) and 11 (sings) of auditory-oral which are repeated in the factor of auditory awareness. Indeed, it was observed that some parents had presented different answers to the same question in the same questionnaire. Therefore, it is recommended that these questions be deleted from the factor of auditory awareness, although the scores of these questions will be calculated for both factors.

#### *Appraisal of the Reliability of the Persian Version of ABEL Questionnaire*

The reliability results showed that the reliability of factor 1 (Alpha=0.94), factor 2 (Alpha=0.86), and factor 3 (Alpha=0.82) was excellent. Besides, the reliability of the entire questionnaire was excellent (0.82) as well; in other words, there was a sufficient inter-item correlation in the questionnaire. On the other hand, the findings revealed an appropriate correlation between factor 1 and factor 2 (Spearman's rho=0.91), factor 1 and factor 3 (Spearman's rho=0.92), and factor 2 and factor 3 (Spearman's rho=0.87). Therefore, the totally Persian version of the questionnaire had an adequate internal consistency.

In addition, the results of test-retest indicated a strength correlation between the children's scores of factor 1 (Spearman's rho=0.94), factor 2 (Spearman's rho=0.92), factor 3 (Spearman's rho=0.82), and total factors

(Spearman's  $\rho=0.96$ ). So, the inter-rater reliability of the Persian version of ABEL questionnaire was excellent.

The overall findings of this study on the reliability of the Persian version of ABEL questionnaire were consistent with the findings of Purdy et al. (2002) who reported an excellent reliability for the original version of the ABEL questionnaire [4].

#### *Application of the Persian Version of ABEL Questionnaire*

As shown in the results, there was a positive correlation between the children's scores and their chronological age (Pearson=0.43) and the duration of wearing hearing aids or cochlear implants (Pearson=0.52). In other words, their auditory behaviors have developed along rising their age and time of using amplification. This finding was congruent with the results provided by Purdy et al. (2002) for the English version of ABEL questionnaire [4] and Freitas de Souza et al. (2011) for the Brazilian Portuguese version of the questionnaire [11]. Besides, actually a child with hearing loss shows better auditory performance if experiencing more auditory stimulations through using appropriate amplification; so, the Persian version of ABEL questionnaire could identify the variations of auditory performance in children with hearing loss in everyday life. Of course, as there is truly a correlation between chronological and time of using amplification, expectantly the children's scores of the ABEL questionnaire increases by an increase in the age. Overall the Persian version of ABEL questionnaire has enough sensitivity.

There was no correlation between the children's scores with their age of fitting/implantation (Pearson=0.35) and type of amplification device (HA or CI) (Spearman's  $\rho=0.10$ ). That was not surprising because the children on average used hearing aids or cochlear implants for 21 months. So, we should not actually find any variations in the children's auditory performance after this time, if the amplification was efficient. Accordingly, the questionnaire did not show any differences between the children who used HA/CI from varied fitting/implantation age. Consequently, the Persian version of ABEL questionnaire has sufficient specificity. In addition, there was no correlation between the children's scores with their severity of hearing loss (Pearson=0.21). It may be due to the small sample size of this study. Therefore, it is recommended that further researches with bigger sample size will longitudinally conducted to evaluate the Persian version of ABEL questionnaire in children wearing hearing aids and cochlear implants.

#### **Conclusion**

The Persian version of ABEL questionnaire is a valid

and reliable tool in order to assessment of development of auditory performance in Persian-speaking children wearing hearing aids and cochlear implants. This questionnaire has adequate sensitivity and specificity to discriminate the children with hearing loss according to different factors such as duration of wearing hearing aids or cochlear implants. So, the ABEL questionnaire can be applied by parents/caregivers, clinicians, and researchers to appraise children's auditory behaviors in everyday life.

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**Conflict of Interest:** None declared.

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