Research Article

Validity and Reliability of the Persian Versions of Primary and Secondary Screening Instrument for Targeting Educational Risk Questionnaires

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Highlights

- Primary & secondary SIFTER questionnaires were translated to Persian by IQOLA method
- The Persian versions of both questionnaires have acceptable validity and reliability
- Questionnaires can differentiate between normal-hearing and hearing-impaired students

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ABSTRACT

Background and Aim: Hearing loss in children leads to speech and language delays, low academic achievement, literacy delays, and psychosocial difficulties. Screening instrument for targeting educational risk (SIFTER) is one of the questionnaires used for evaluation of students' performance in schools. The current study aims to develop Persian versions of primary and secondary SIFTER questionnaires and assessing their validity and reliability.

Methods: The main English versions of primary and secondary SIFTER questionnaires were translated into Persian named as P-SIFTER and secondary P-SIFTER. Then, their face validities were determined based on the options of related experts. The final versions were completed by 55 teachers of 150 students (64 primary and 86 secondary school students) divided into two groups of hearing-impaired (HI) and normal-hearing (NH) students. The test-retest reliabilities were assessed in 117 students (64 primary and 53 secondary school students).

Results: The results revealed that these questionnaires had high face validity. The content validity index for P-SIFTER and secondary P-SIFTER were obtained 0.94 and 0.92, respectively. The total score of P-SIFTER was 51.85 and 65.41 in HI and NH students, respectively. For the secondary P-SIFTER, it was 58.75 and 67.48, respectively. The test-retest reliability showed high correlation for NH and HI students between P-SIFTER and secondary P-SIFTER scores. The Cronbach's alpha value for the overall score of P-SIFTER was 0.96 for both HI and NH students; for secondary P-SIFTER, the values were 0.94 and 0.93, respectively.

Conclusion: The Persian versions of primary and secondary SIFTER questionnaires have acceptable validity and reliability.

Keywords: Educational need; electronic questionnaire; hearing impaired; questionnaire; students

Introduction

Hearing loss can affect one or both ears resulting in difficulty hearing speech and, in more severe cases, leading to failure in social communication [1, 2]. The prevalence of profound congenital hearing loss is high; approximately 0.8–3 in 1000 live births in the US [3] and 1 in 3000 live births in Iran [4]. About 15.2–22.6% of school-aged children have an elevated pure-tone hearing thresholds indicating a high prevalence of hearing loss among this population [5]. It is well documented that the prevalence of speech and language delays, low academic achievement, literacy delays, and psychosocial difficulties are more prevalent in children with congenital hearing loss compared to normal-hearing (NH) peers [6, 7]. Moreover, language development and school performance in children with mild to severe hearing loss are negatively affected in comparison with NH children [5]. Hearing-impaired (HI) children have demonstrated high levels of emotion control than NH children; however, their positive features of friendship are still lower than those of NH peers [8]. Children with hearing loss have lower participation in physical activities and sports which greatly affect their self-efficacy and social development [9].

Early hearing detection and intervention of hearing loss in children have positive impact on language development of HI children facilitating their access to appropriate support [10]. Early intervention reduces communication, social, psychological and educational difficulties in HI children. These children study in mainstream or specialized schools. Mainstreaming is the practice of placing students with special education services in a general education classroom in a regular school. In specialized schools, there are only HI children and specialized teachers without NH peers [11].

Screening is necessary to identify children who are at risk of educational failure due to hearing loss in mainstream schools to allocate facilities for them. One of the low-cost methods for identifying the consequences of hearing loss is the use of questionnaire [12]. They can assess different features in HI children such as psychological, social, educational, speech and language development. They are helpful and effective tools to determine primary and secondary handicaps [13]. The questionnaires can be completed by children or by those who are in contact with them. There are several questionnaires designed for HI children such as the profile hearing aid benefit that is suitable for determining a child's hearing aid performance [14], the meaningful auditory integration scale that is a parent-report questionnaire for children with profound hearing loss [15], the parent's evaluation of aural/oral performance of children questionnaire that is designed to record how a child hears and communicates with their hearing aids or cochlear implants in a specific situation [14], and the teacher's evaluation of the aural/oral performance of children (TEACH) questionnaire introduced by Ching and Hill in [16]. Since school-aged HI children spend a remarkable amount of their time in the school, teachers can be appropriate evaluators.

The screening instrument for targeting educational risk (SIFTER) is another teacher- based questionnaire. There are three versions of SIFTER including Preschool SIFTER, SIFTER, and secondary SIFTER which can assess five aspects of preacademics, attention, communication, class participation, and school behavior. These three versions were designed by Anderson and Matkin, Anderson, and Anderson, respectively [17]. The SIFTER has been translated into Mandarin [18] and Arabic [19]. Teacher's evaluation of the aural/oral performance of children, parents' evaluation of aural/oral performance of children, meaningful auditory integration scale and profile hearing aid benefit can be used for a limited age groups of children, while these three versions of SIFTER can be used for the evaluation of wider age groups of children from preschool to secondary school. The SIFTER questionnaires are for the evaluation of HI children who are studying in mainstream schools and do not receive educational services, directly [13]. They can be used to assess the school performance of students with unilateral or bilateral hearing loss compared to their NH peers and are valid tools to assess the effectiveness of hearing aids [19-21], cochlear implants [22-24], FM system [25, 26]. Each version contains 15 items and takes 10 minutes to complete. The current study aims to develop the Persian versions of primary and secondary SIFTER questionnaires and assess their validity and reliability. Their use by the audiologists can lead to early detection of hearing loss and prevents the consequences of hearing loss in Iranian children, and can help teachers decide whether HI children are able to attend the classroom along with NH children.

Methods

The two original versions of SIFTER have 15 items and 5 subscales of preacademics, attention, communication, class participation, and school behavior (3 items for each subscale). Each item is rated on a 5-point Likert scale from 1 to 5. The score of each subscale ranges from 3 to 15. Hence, the total score is in a range of 15 to 75.

The students' performance is classified as pass, marginal, or fail. These three levels are determined differently in primary and secondary SIFTER questionnaires. In the primary SIFTER, scores in the preacademics subscale are between 10–15, 8–9, and 3–7 indicating pass, marginal, and fail levels, respectively. For the secondary SIFTER, the determination of pass, marginal and fail levels are based on the scores between 10–15, 8–9, and 1–7, respectively.

This study was conducted at four steps; translation, validity assessment, administration of the two Persian versions of the SIFTER named as P-SIFTER and secondary P-SIFTER, and reliability assessment. Before translating from English to Persian, permissions were obtained from the developers of main versions. The two versions of SIFTER were then translated separately by two experienced translators in accordance with the International Quality of Life Association protocol [27]. Afterwards, the translated versions were merged by the research team. In the next step, two translators translated the Persian versions back to English. These two back translations were then merged by the research team and two initial versions were provided. These versions were sent to the developers of main versions to receive feedback after their confirmation, the two Persian versions of SIFTER were presented to 10 Persian audiologists and 10 Persian teachers to rate the quality of translations, age matching, and cultural compatibility based on a 4-point Likert scale. For the evaluation of face validity, the two Persian versions were presented again to those 10 Persian audiologists. They rated the probability of the questions on a 5-point Likert scale from 1=completely disagree to 5=completely agree. For content analysis, content validity ratio (CVR) and content validity index (CVI) were calculated and interpreted based on Lawashe method.

After considering the comments of teachers and audiologists on the initial translations of the two versions, the last Persian versions were prepared and converted into electronic versions.

After obtaining necessary permits from the education organizations of Tehran and Ahvaz provinces, the link of two Persian SIFTER questionnaires were provided to 55 teachers of 150 students (64 primary school students and 86 secondary school students). Students were divided into two groups of NH and HI students (with moderate to profound hearing loss in primary schools and mild to profound hearing loss in secondary schools). The HI primary school students had normal speech and language development, using hearing aid and cochlear implant with oral and/or manual communication (sign language). However, most of HI secondary school students had no hearing aids and were using a sign language for communication. Both groups of HI students had normal intelligent quotient (IQ). To use SIFTER questionnaires on mainstream schools, a selected teacher receives two questionnaires for both NH and HI students. However, due to COVID-19 pandemic, sporadic distribution of students in mainstream schools, and limited access to the students, different teachers were selected randomly from both regular and specialized schools (not mainstream schools) in Tehran and Ahvaz. It took about two months for them to complete the questionnaires. HI students' teachers were proficient in teaching with more than ten years of experience. They were asked to select some students randomly and assess their performance using the questionnaires. During the pandemic, since the classes are held virtually, some teachers could not assess the student's current performance in online mode. The teachers who knew the students for about three years, answered the questions based on their previous knowledge, while those who knew the students for one year completed the questionnaires based on the students' performance in the virtual classroom. To assess the test-retest reliability, paired t-test, Wilcoxon signed-rank test and Spearman correlation test were used on data from 117 students including 64 primary school students (29 NH students and 35 HI students) and 53 secondary school students (19 NH students and 34 HI students). Twenty-five out of 55 teachers filled in the questionnaire twice at an interval of one to two weeks. Twelve teachers of 33 secondary school students did not complete the questionnaires for the second time.

Results

Face validity refers the degree which a test appears to measure the variable that it is supposed to measure [28].

For the P-SIFTER, the CVI was 0.94 and the CVR for all items was 1 except for items 11, 13, and 15 which was 0.8. For secondary P-SIFTER, CVI was 0.92, CVR for all items was 1 except items 4, 5, 8 and 12 which was 0.8.

Table 1 shows the total scores and subscales score of P-SIFTER and secondary P-SIFTER and the results of independent t-test. All scores were significantly higher in NH students than in HI students ($p<0.05$). However, no significant difference was observed between NH and HI groups in terms of school behavior subscale ($p>0.05$).

Table 1. Mean and standard deviation for Persian screening instrument for targeting educational risk and Persian secondary screening instrument for targeting educational risk in both groups

Content areas		Mean (SD)		p
		Normal-hearing	Hearing-impaired	
P-SIFTER (n=64)	Education	13.41 (3.01)	10.17 (3.60)	<0.001
	Attention	12.13 (3.51)	9.82 (3.66)	0.013
	Communication	13.44 (2.61)	9.42 (3.78)	<0.001
	Class Participation	13.17 (2.84)	10.60 (3.44)	0.002
	School behavior	13.24 (3.18)	11.85 (2.74)	0.066*
	Total score	65.41 (13.92)	51.85 (15.8)	0.001
P-secondary SIFTER (n=86)	Education	13.75 (1.86)	11.57 (2.98)	0.000
	Attention	12.9 (2.63)	11.40 (3.30)	0.023
	Communication	13.58 (1.92)	11.06 (3.18)	<0.001
	Class Participation	13.39 (2.18)	11.77 (3.13)	0.008
	School behavior	13.85 (1.79)	12.93 (2.80)	0.077*
	Total score	67.48 (8.9)	58.75 (13.33)	0.001

* No significant correlation (p>0.05)

P-SIFTER; Persian screening instrument for targeting educational risk, P-secondary SIFTER; Persian secondary screening instrument for targeting educational risk

Table 2. The test-retest reliability of the Persian screening instrument for targeting educational risk and Persian secondary screening instrument for targeting educational risk in normal-hearing and hearing-impaired students measured by Spearman correlation test

Questionnaires	Content areas	Normal-hearing		Hearing-impaired	
		r	p	r	p
P-SIFTER (n=64)	Education	0.71	<0.001	0.86	<0.001
	Attention	0.72	<0.001	0.71	<0.001
	Communication	0.75	<0.001	0.81	<0.001
	Class participation	0.87	<0.001	0.80	<0.001
	School behavior	0.58	<0.001	0.75	<0.001
	Total score	0.83	<0.001	0.87	<0.001
P-secondary SIFTER (n=53)	Education	0.49	<0.001	0.73	<0.001
	Attention	0.48	<0.001	0.78	<0.001
	Communication	0.41	<0.001	0.79	<0.001
	Class participation	0.65	<0.001	0.75	<0.001
	School behavior	0.48	<0.001	0.84	<0.001
	Total score	0.57	<0.001	0.85	<0.001

P-SIFTER; Persian screening instrument for targeting educational risk, P-secondary SIFTER; Persian secondary screening instrument for targeting educational risk

Table 3. Internal consistency of the Persian screening instrument for targeting educational risk and Persian secondary screening instrument for targeting educational risk in normal-hearing and hearing-impaired students measured by Cronbach's α

Content areas		Normal-hearing	Hearing-impaired
		Cronbach's α	Cronbach's α
P-SIFTER (n=64)	Education	0.96	0.95
	Attention	0.87	0.92
	Communication	0.90	0.94
	Class participation	0.80	0.87
	School behavior	0.90	0.77
	Total score	0.96	0.96
P-secondary SIFTER (n=86)	Education	0.9	0.82
	Attention	0.83	0.84
	Communication	0.84	0.86
	Class participation	0.76	0.85
	School behavior	0.68	0.87
	Total score	0.93	0.94

P-SIFTER; Persian screening instrument for targeting educational risk, P-secondary SIFTER; Persian secondary screening instrument for targeting educational risk

Table 4. The correlation between five content areas and each content area with the total score in Persian screening instrument for targeting educational risk measured by Spearman correlation test

Correlation	Normal-hearing (n=29)		Hearing-impaired (n=35)	
	r	p	r	p
Education and attention	0.56	<0.001	0.79	<0.001
Education and communication	0.81	<0.001	0.86	<0.001
Education and class participation	0.55	0.002	0.80	<0.001
Education and school behavior	0.50	0.006	0.68	<0.001
Attention and communication	0.54	0.003	0.81	<0.001
Attention and class participation	0.71	<0.001	0.75	<0.001
Attention and school behavior	0.70	<0.001	0.70	<0.001
Communication and class participation	0.57	<0.001	0.88	<0.001
Communication and school behavior	0.40	0.028	0.74	<0.001
Class participation and school behavior	0.75	<0.001	0.82	<0.001
Education and total score	0.75	<0.001	0.90	<0.001
Attention and total score	0.86	<0.001	0.90	<0.001
Communication and total score	0.74	<0.001	0.94	<0.001
Class participation and total score	0.85	<0.001	0.91	<0.001
School behavior and total score	0.74	<0.001	0.85	<0.001

Table 5. The correlation between five content areas and each content area with the total score in Persian secondary screening instrument for targeting educational risk measured by Spearman correlation test

Correlation	Normal-hearing (n=41)		Hearing-impaired (n=40)	
	r	p	r	p
Education and attention	0.59	<0.001	0.64	<0.001
Education and communication	0.82	<0.001	0.82	<0.001
Education and class participation	0.62	<0.001	0.67	<0.001
Education and school behavior	0.55	<0.001	0.60	<0.001
Attention and communication	0.63	<0.001	0.66	<0.001
Attention and class participation	0.74	<0.001	0.72	<0.001
Attention and school behavior	0.59	<0.001	0.53	<0.001
Communication and class participation	0.62	<0.001	0.80	<0.001
Communication and school behavior	0.47	<0.001	0.62	<0.001
Class participation and school behavior	0.75	<0.001	0.60	<0.001
Education and total score	0.78	<0.001	0.88	<0.001
Attention and total score	0.89	<0.001	0.84	<0.001
Communication and total score	0.78	<0.001	0.9	<0.001
Class participation and total score	0.88	<0.001	0.88	<0.001
School behavior and total score	0.75	<0.001	0.73	<0.001

Shapiro-Wilk test was used to assess the normality of distribution for the variables. Since its results revealed that the variables in both HI and NH groups were not normally distributed, non-parametric tests were used. Table 2 presents the results of Spearman correlation test for assessing test-retest reliability which show a significant correlation between test-retest scores of P-SIFTER in 29 NH and 35 HI subjects ($p<0.05$) and secondary P-SIFTER in 19 NH and 34 HI students ($p<0.05$) in terms of total score and subscale score. Since the sample size was more than 30, the test-retest reliability was measured by paired t-test for P-SIFTER and in HI students of secondary schools for secondary P-SIFTER. There was no significant difference between the mean test and retest scores ($p<0.05$). Due to non-normal distribution and low sample size of NH secondary school students (n=19), test-retest reliability was measured by Wilcoxon signed-rank test, and results showed no significant difference between the test and retest scores in preacademics, communication and class participation dimensions ($p<0.05$).

For evaluation of internal consistency, Cronbach's α was determined. The results summarized in Table 3 for both groups in both questionnaires. The Cronbach's alpha value of P-SIFTER was in a range of 0.87–0.96 for NH students and 0.77–0.96 for HI students. For secondary P-SIFTER, the Cronbach's value was 0.68–0.93 in NH students and 0.82–0.94 in HI students. The results of correlation between five subscales scores and between each subscale score and the total score in P-SIFTER and secondary P-SIFTER are presented in Tables 4 and 5, respectively. The results showed a significant correlation between all the mentioned variables ($p<0.05$)

Discussion

The purpose of the current study was to develop Persian versions of primary and secondary SIFTER questionnaires and assess their validity and reliability. P-SIFTER and secondary P-SIFTER had high and acceptable CVI. Based on the Lawshe method, CVI>0.62 is acceptable when 10 experts are used for rating [29]. Our findings for primary school students are consistent with the results of

Fatahi et al. who translated TEACH questionnaire into Persian and assessed its face validity and reliability in 40 NH and 44 HI primary school students. By comparing the auditory performance of the two groups, CVI for most of the Persian TEACH items were reported 1 which was considered high and acceptable [30]. Regarding discriminant validity of the Persian questionnaires, our findings showed that the NH students had higher performance scores in all subscales of both questionnaires compared to HI group except in school behavior subscale in which the two groups had similar performance. Our findings are somehow consistent with those of Dancer et al. who studied SIFTER on 18 students with unilateral hearing loss and 15 NH students. The mean scores of all five subscales in NH students were significantly higher than in HI peers [20]. One study used the Arabic SIFTER in 33 HI and 60 NH students and similar to our findings, reported that the scores in NH students were significantly higher than in HI peers. Surprisingly, those with slight and mild unilateral hearing loss had lower performance than those with severe hearing loss [19]. Li applied the Mandarin SIFTER on 120 students divided into two groups of pass and fail groups based on the audiology assessment and found no significant difference between the two groups [18]. It should be noted that the degree of hearing loss in the fail group was slight or mild and not moderate or severe.

Regarding the reliability of two Persian SIFTER questionnaires, results showed their high test-retest reliability and internal consistency (measured by Cronbach's alpha) between the five subscale scores and between each subscale score and total score. To the best of our knowledge, there is no report on the correlation of the subscales of SIFTER and secondary SIFTER in other studies. Li [18] and Most [19] reported high level of internal consistency for all 15 items in Mandarin and Arabic SIFTER, respectively.

One of the main limitations of the current study was the COVID-19 pandemic. Direct communication with the teachers was not possible and the procedure was conducted online. The questionnaires' link and descriptions were sent to the teachers by the principals. Researchers could not provide support or answer the questions of teachers, if there were any. Furthermore, the research conducted at the middle and end of semester. It would be possible that the primary school teachers could not have enough time to complete the questionnaires.

It is recommended that the reliability of three Persian versions of SIFTER questionnaire should be examined in mainstream schools as well as the relationship between the scores of all versions of SIFTER questionnaire. Moreover, further studies are recommended for evaluating the relationship of the mean scores of all versions of SIFTER questionnaire between students with cochlear implants (or hearing aids) and NH students as well as students with central auditory processing disorder.

Conclusion

The Persian-screening instrument for targeting educational risk (P-SIFTER) and secondary P-SIFTER have acceptable face validity, reliability and internal consistency and can differentiate between normal-hearing (NH) and hearing-impaired (HI) students. In both questionnaires, the scores of the most of subscales as well as the total score are lower in HI children than in NH students, indicating a need for special attention and providing services to HI students.

Ethical Considerations

Compliance with ethical guidelines

This study was approved by the Ethics Committee of Tehran University of Medical Sciences (Code: IR.TUMS.FNM.REC.1399.021).

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Authors' contributions

FK: Study design, data collection, interpretation of the results, final analysis, and drafting the manuscript; FF: Study design, interpretation of the results, and drafting the manuscript supervising the manuscrit; NR: Design advising in questionnaire and manuscript; SJ: Statistical analysis and final confirm the interpretation; AK: Interpretation of the results and critically revising the questionnaire and manuscript.

Conflict of interest

The authors declared no conflict of interest.

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