Development of Persian version of teachers’ evaluation of aural/oral performance of children scale

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Abstract

Background and Aim: Teachers’ evaluation of aural/oral performance of children (TEACH) scale is one of the scales used for assessing hearing-impaired children’s behaviors in real-life environments, regardless of the degree of hearing loss. The aim of the present study was development, determining validity and reliability of the Persian TEACH (P-TEACH) in normal-hearing and hearing-impaired children.

Methods: The TEACH scale was translated and cross-culturally adapted. After verifying the face validity of the scale, P-TEACH was performed on 40 normal-hearing and 42 hearing-impaired and its’ results were compared with the Persian parents’ evaluation of aural/oral performance of children (P-PEACH). The test-retest reliability of P-TEACH was evaluated after two weeks on 10 subjects who were selected randomly.

Results: Content validity index for item 3 was 0.8 and for others were 1. P-TEACH scores showed a significant difference between two groups (p < 0.001). There was a strong correlation between P-TEACH and P-PEACH scores (r = 0.59 to 0.87; p < 0.05). Cronbach’s α for P-TEACH was 0.75 -0.98 for both groups. There was a significant correlation between children’s age and total score of P-TEACH in normal-hearing and hearing-impaired children (r = 0.40 and 0.41 respectively; p ≤ 0.001). There was a significant correlation between test and retest of P-TEACH (r = 0.87 to 0.97; < 0.001).

Conclusion: P-TEACH is a well-adapted valid and reliable tool for functional evaluation of the auditory performance of hearing-impaired children. The study showed that the P-TEACH has a strong agreement with the P-PEACH.

Keywords: Evaluation of aural/oral performance of children; hearing impairment; parents' evaluation of aural/oral performance of children; reliability; teachers; validity

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Introduction

The prevalence of sensory neural hearing loss (SNHL) ranges from one to three per 1000 newborns [1]. For infants in neonatal intensive care units (NICU) this prevalence reaches 7.8% [2]. The incidence of hearing impairment in
neonates in Iran has been shown to be 8% in high-risk neonates and 16% in neonates in NICU [3]. Undetected/untreated hearing loss has potentially many adverse effects on speech and language, educational and also social development of children [4,5]. Today, newborn hearing screening leads to early diagnosis of hearing impairment and early auditory intervention. The aim is helping hearing-impaired children to have similar auditory, speech, language, academic and social development to their normal-hearing peers [6]. Objective auditory evaluations such as auditory brainstem response and otoacoustic emissions are two tests that have made it possible to identify hearing loss at a very young age. Although these tests are very practical for identifying and monitoring hearing in children, they are not actually hearing tests and in some conditions such as auditory neuropathy, they are not reliable [7-9]. In addition, hearing aid prescription and fitting cannot be done with just these objective tests. Cortical evoked responses using speech stimuli have been shown to be effective for hearing aid fitting but they are not available in all clinics and they need children to be awake and relax during the test [10]. Finally, their relation to the real-life function of hearing-impaired children who are hearing assistive device users is not simple and completely predictable [11,12]. Behavioral auditory tests can be conducted on infants from birth. There are specific behavioral techniques for each age group including behavioral observational audiometry for infants less than 6 months of age, visual reinforcement audiometry for 6–36 month-old children, and conditioned play audiometry for children above 3 years of age. The behavioral audiometry can be performed with and without hearing assistive device and users’ functional aid is very helpful for hearing aid/cochlear implant fitting but they are not enough. Behavioral tests have low reliability in very young children and only experienced clinicians might be able to extract a correct response from children [8]. In addition, there are reports showing that despite appropriate functional hearing, auditory-language skills development of children might face problem. In addition, a proportion of hearing-aid users in time do not show acceptable auditory development despite full-time use of best-fitted hearing aid and aural rehabilitation, so cochlear implant candidacy must be considered for them. Behavioral audiometry and testing functional aid is not enough and conclusive [13,14].

For evaluation of the actual performance of the assistive hearing device and auditory performance of children in real-life situations, questionnaires are valid and reliable tools. The questionnaires try to target important listening situations in real-life [15-17]. The respondent of these questionnaires is mostly parents, caregivers, and teachers. Mainly respondents have to observe children’s behaviors for a given period of time and then answer the questions accordingly. These tools cover auditory behaviors in various environments including noisy challenging situations [18-21]. Bagatto and Scollie reported that there are 12 subjective outcome measurements for children. The hearing aid benefit scale for infants/toddlers (HABIT), infant-toddler meaningful auditory integration scale (IT-MAIS), LittIEARS auditory questionnaire (LittIEARS or LEAQ) and parents’ evaluation of aural/oral performance of children (PEACH) diary were the most common and precise ones [18].

The PEACH was developed by Ching and Hill as a measure of functional performance in everyday life, based on a parents’ observation. Parents must observe children in real life auditory situations and complete this scale. Items are related to aural and oral-related behaviors of the children and there is a booklet that parents are encouraged to have with them for one week and identify how often their children do specified activities. Then in a structured interview, the audiologist completes the PEACH. Scoring of each item is based on a 5 point scale from 0 (never) to 4 (always) [19]. The P-PEACH was developed by Naghibirad et al. [22]. Studies have shown that there is a strong correlation between cortical auditory evoked potentials with speech stimuli and PEACH scores [23,24]. However, hearing-impaired children spend a considerable proportion of their time in the
auditory training classes, speech therapy classes, kindergarten or school, therefore teachers’ observations of auditory behaviors of them are very important and can complete parents’ report. Teachers’ evaluation of aural/oral performance of children (TEACH) was adapted from PEACH by Ching et al. to achieving this goal [25]. The aim of the present study is the translation, determining the reliability and validity of TEACH in Persian language and comparing its’ results with P-PEACH in normal and hearing-impaired children.

Methods
After obtaining formal permission from the original author, the TEACH scale was translated into Persian and cross-culturally adopted according to international quality of life assessment project [26] (appendix 1). TEACH has 9 items for examining children’s auditory behaviors in early education settings. As there are a high overlap and similarities between booklet and items of the TEACH and P-PEACH, only different items were translated. TEACH does not have two items of PEACH related to telephone conversations.

For evaluation of the face validity, the items were evaluated by 10 Persian native audiologists and 10 Persian native teachers. They rated whether the questions could assess the question construct by a 5-point Likert scale (1 = completely disagree and 5 = completely agree).

In a cross-sectional comparative study, PEACH (6 items for quiet situation and 5 for noisy situations) and TEACH (5 for quiet situations and 4 for noisy situations) were studied on 40 normal-hearing and 42 hearing-impaired children for evaluation of discriminant validity and concurrent validity. The inclusion criteria were as follow: native Persian-speaking parents with at least primary school education, lack of neurologic disorders, lack of otitis media (normal otoscopy and type An tympanometry), at least eight hours use of hearing aid/cochlear implant per day for hearing-impaired children, hearing thresholds ≤ 15 dB HL for audiometric frequencies for normal-hearing subjects and severe to profound unaided thresholds for hearing-impaired subjects (based on age-appropriate behavioral audiometry). Subjects with otitis media and other disabilities were excluded from the study.

In a session, the author explained the aim of the study and administering the P-TEACH and P-PEACH scales. One example of administering the questionnaires was given to the parents (for P-PEACH) and teachers (for P-TEACH). Time was given to parents and teachers to study the booklet and ask their questions. They were asked to record as many behaviors as they can in two weeks by observing children’s behaviors closely and systematically. Then the questionnaires were completed in a structured interview by the author after one week. Each item has a five-point Likert scale from 0 to 4 (0 = No examples were given or child did not demonstrate any observable auditory response, 1 = If one or 2 examples were provided or auditory response occurred 25% of the time, 2 = If three or 4 examples were provided or auditory response occurred 50% of the time, 3 = If four or 5 examples were provided or auditory response occurred 75% of the time, 4 = If more than 6 examples were provided or response occurred more than 75% of the time) [27]. The total score and subscale scores (quiet and noise subscales) were examined for P-TEACH and P-PEACH. In both questionnaires, the first two questions are related to daily use of the device and reaction to loud sounds which are not included in the scoring. For evaluation of the test-retest reliability, P-TEACH was re-tested after two weeks in 10 children. These children were selected randomly from hearing-impaired subjects.

Informed consent was obtained from the parents and the study was approved by the ethics committee of TUMS (Code: IR.TUMS.FNM.REC. 1398.160). SPSS 17 (IBM SPSS® Statistics) was used for analyzing data. For content validity index (CVI) Lawshe method, for discriminant validity Mann-Whitney-U test, for concurrent validity spearman correlation for internal consistency Cronbach’s α and for test-retest reliability spearman correlation were evaluated.
**Table 1. The frequency of normal hearing and hearing-impaired children across age groups**

| Age Group          | Normal hearing subjects | Hearing-impaired subjects |
|-------------------|-------------------------|---------------------------|
| 2–3.5 years old   | 2                       | 9                         |
| 3.6–5 years old   | 20                      | 21                        |
| 5.1–6.5 years old | 15                      | 10                        |
| 6.6–11 years old  | 3                       | 2                         |
| Total             | 40                      | 42                        |

**Results**

The score of fluency and intelligibility of the final translation of the P-TEACH was calculated. The mean score of item 1 and 7 was 4.5; item 2, 3, 5, 8–10 were 5; and item 4 was 4.

In evaluation of the face validity, CVI was determined based on the Lawshe method. CVI for item 3 of TEACH was 0.8 and for all remaining items were 1.

In evaluation of discriminant validity, P-TEACH and P-PEACH were examined on 82 children including 42 hearing-impaired children (including 21 girls) with a mean age of 4.64 ± 0.76 years old and 40 normal-hearing children with a mean age of 4.49 ± 0.34 years old.

32 hearing-impaired children were hearing aid users (4 of them were in the cochlear implantation surgery waiting list) and 10 were cochlear implant users. The distribution of normal-hearing and hearing-impaired children across age groups is shown in Table 1. In the present study all mothers had literacy skill. The score of the TEACH and PEACH scales is summarized in Table 2, for both groups. Based on Mann-Whitney-U test the total and subscale scores of P-TEACH showed a significant difference between two groups (p < 0.001) which is indicative of good discriminant validity of P-TEACH.

For evaluation of concurrent validity Spearman correlation test showed a strong correlation between total and subscale scores of P-TEACH and P-PEACH (Table 2).

For evaluation of internal consistency, Cronbach's α was determined. The results are summarized in Table 3 for both groups. As it is shown, Cronbach's α for P-TEACH is between 0.75 to 0.98 for hearing-impaired and normal-hearing subjects. In addition, there was a significant correlation between children's age and total score of P-TEACH in normal-hearing (r = 0.40; p = 0.001) and hearing-impaired subjects (r = 0.41; p < 0.001) based on Spearman correlation test.

Spearman correlation test showed that there was a significant correlation between test-retest scores of P-TEACH in 10 subjects. The correlation for total and subscale scores is shown in Table 3.

**Discussion**

The final translation of P-TEACH was highly fluent and intelligible for the target group based on the score they gave to each item on a 5 point Likert scale. In the present study CVI for item 3 of TEACH was 0.8 and for all remaining items were 1. Based on the Lawshe method, CVI > 0.42 is acceptable when we use 20 experts for rating [28]. Therefore, all items have high acceptable CVI. In addition there was a significant difference between normal-hearing and hearing-impaired groups regarding P-TEACH score. Normal hearing subjects had higher scores than hearing-impaired subjects. It is indicative of high discriminant validity of P-TEACH scale. Emerson studied PEACH and TEACH in rural area in India on 60 cases. Children were six months old to 15 year-old and suffered from moderately severe or profound hearing loss. Emerson did not use normal-hearing subjects. It was found that children with moderately severe and severe hearing loss had better scores compared to children with profound hearing loss. Therefore PEACH and TEACH had good discriminant validity [27]. It shows that normal-hearing subjects, as expected, have better auditory behaviors at home and in the class.

In the present study in all subjects the score of P-TEACH was lower than P-PEACH but there was no significant difference and also there was a high correlation between P-TEACH and P-PEACH total and subscale scores. Emerson also...
showed that there was a high correlation between TEACH and PEACH but PEACH score was lower than TEACH. They only evaluated children with hearing impairment [27]. It seems that teachers have more strict criteria for evaluation of children than parents. This happens regardless of hearing status of children. However, there is a high agreement between parents’ and teachers’ evaluations of children’s auditory behaviors.

In addition, Cronbach’s α for P-TEACH is between 0.75 to 0.98 (acceptable to excellent) for hearing-impaired and normal-hearing subjects. To the best of our knowledge there is no report for TEACH internal consistency in other languages. Quar et al. showed high internal consistency (Cronbach's alpha = 0.93) for PEACH and they reported that near-perfect scores were achieved by Malaysian children around 40 months of age [28].

There was a significant correlation between children’s age and total score of P-TEACH in normal-hearing and hearing-impaired subjects. It means that in both groups, children obtain more score in P-TEACH and P-PEACH scales with age and therefore they show improvement in auditory behaviors. To the best of our knowledge there is not any study reporting the relation between TEACH score and children’s age. However, Quar et al. showed the same results for Malay PEACH. They showed that children from six month of age show auditory skills which improves with age. They found that PEACH scores for children below two years of age were lower than English version. Analysis of each item of PEACH scale revealed that parents designated low score to the item related to “ability of children to participate in conversation” for children below two years of. As this item focuses on the assessment of the children’s auditory/oral skills, different demographic factors such as socioeconomic status and race may have determining effects on discrepancies found between the scores of the original English

### Table 2. Mean, standard deviation, and correlation between Persian versions of teachers’ and parent’s evaluation of aural/oral performance of children scores in normal hearing and hearing-impaired subjects

|                        | Normal hearing subjects (n = 40) | Hearing-impaired subjects (n = 42) |
|------------------------|---------------------------------|-----------------------------------|
|                        | TEACH  | PEACH   | Correlation (p) | TEACH  | PEACH   | Correlation (p) |
| Total score            | 32.55 ± 3.66 | 39.90 ± 2.76 | 0.59 (p = 0.03) | 27.06 ± 8.3 | 33.47 ± 6.85 | 0.87 (p < 0.001) |
| Quiet subscale         | 18.68 ± 1.75 | 23.80 ± 3.67 | 0.62 (p = 0.02) | 15.63 ± 4.53 | 19.12 ± 3.98 | 0.79 (p < 0.001) |
| Noisy subscale         | 13.86 ± 1.80 | 16.45 ± 2.76 | 0.73 (p = 0.02) | 11.19 ± 3.22 | 14.40 ± 3.36 | 0.66 (p < 0.001) |

### Table 3. Internal consistency and test-retest reliability of the Persian version of teachers’ evaluation of aural/oral performance of children scores in normal hearing and hearing-impaired children

|                        | Normal hearing subjects | Hearing-impaired subjects |
|------------------------|-------------------------|---------------------------|
|                        | Cronbach’s α | Correlation | p | Cronbach’s α | Correlation | p |
| Quiet subscale         | 0.75         | 0.97        | < 0.001 | 0.91         | 0.96        | < 0.001 |
| Noisy subscale         | 0.81         | 0.98        | < 0.001 | 0.91         | 0.97        | < 0.001 |
| Total score            | 0.88         | 0.87        | < 0.001 | 0.90         | 0.91        | < 0.001 |
version and the scores of the Malay version. Therefore different norms might be necessary for different versions of these scales [28]. Ching and Hill also showed that PEACH score increases with age from six months to three years old children. They suggested that hearing-impaired children with early intervention including suitable auditory assistive device and auditory training show progress in auditory skills in time. They suggested that future research will be needed to examine the relation between functional performance of children who receive early intervention and their normally hearing peers [19].

In this study there was a significant correlation between test-retest scores of TEACH. There is no study on the test-retest reliability of TEACH. Quar et al. investigated the test-retest reliability of Malay PEACH in 9 subjects and showed high test-retest reliability [28]. Ching and Hill studied correlation coefficients of PEACH total score for the test and retest ($r = 0.93, p < 0.0001$) and quiet and noise subscale scores ($r = 0.81$ and $r = 0.93$ respectively; $p < 0.0001$). The correlation coefficients reflect both repeatability and the range of scores. They suggested that coefficients are indicative of the extent to which individuals who scored relatively low (or high) on one occasion also scored relatively low (or high) on a second occasion [19].

**Conclusion**
The P-TEACH is a well-adapted valid and reliable tool for functional evaluation of the auditory performance of hearing-impaired children. The study showed that the P-TEACH has a strong agreement with the P-PEACH.

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**Conflict of interest**
No potential conflict of interest relevant to this article was reported.

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## نسخه فارسی پرسشنامه ارزیابی ارتباط معنی از عملکرد شفاهی/اشتیاری کودکان

| سوال | توضیحات |
|------|----------|
| 1    | کودک چقدر از سمع و یا کلاس حرف اضافه می‌کند؟ |
| 2    | کودک چقدر از صدا بیلند شکایات می‌کند یا این بات بازی کردن می‌شود؟ |
| 3    | وقتی در یک محیط ماطاد کودک را می‌زنیم یا یا پا را یکدید | زمانی که در یک محیط ماطاد، دستورات و کارهای ساده را از کودک می‌خواهد، یا همانطوری‌که زمانی که در یک محیط ماطاد، دستورات و کارهای ساده را از کودک می‌خواهد، یا همانطوری‌که | | |
| 4    | وقتی کودک را در یک محیط پر سروصدایی می‌زنیم یا در شرایطی که صوت شا را دنیا می‌زنیم یا پا را یکدید | آیا یکدید یا نیست؟ | زمانی که من در یک محیط ماطاد، دستورات و کارهای ساده را از کودک می‌خواهم، یا همانطوری‌که | | |
| 5    | زمانی که من در یک محیط ماطاد، دستورات و کارهای ساده را از کودک می‌خواهم، یا همانطوری‌که | | | |
| 6    | زمانی که من در یک محیط ماطاد، دستورات و کارهای ساده را از کودک می‌خواهم، یا همانطوری‌که | | | |
| 7    | زمانی که من در یک محیط ماطاد، دستورات و کارهای ساده را از کودک می‌خواهم، یا همانطوری‌که | کودک چقدر از صدا بیلند شکایات کودک یا این بات بازی کردن می‌شود؟ |
| 8    | کودک چقدر از صدا بیلند شکایات کودک یا این بات بازی کردن می‌شود؟ |
| 9    | کودک چقدر از صدا بیلند شکایات کودک یا این بات بازی کردن می‌شود؟ |
| 10   | کودک چقدر از صدا بیلند شکایات کودک یا این بات بازی کردن می‌شود؟ |
| 11   | کودک چقدر از صدا بیلند شکایات کودک یا این بات بازی کردن می‌شود؟ |

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نرسخه فارسی دفترچه روزنامه‌ای از مجموعه معلم از انواع شناخته‌شناسی کودکان

یک کودک
نوروز
در این آزمایش، کودکان با توجه به عناصر مختلف در حال کار با یکدیگر می‌باشند.

روش‌های معلمان

***TEACH***

در این آزمایش، کودکان با توجه به عناصر مختلف در حال کار با یکدیگر می‌باشند.

چرا باید از این برنامه استفاده کرد?

مشابه شدن دختران در درمان با مشابه کودکان می‌تواند منجر به بهبود مهارت‌های آموزشی و سایر‌هایی باشد که در این زمینه اثرات زیست‌شناسی کودکان می‌تواند منجر به بهبود مهارت‌های آموزشی و سایر‌هایی باشد.

چگونه باید این برنامه استفاده کرد؟



نام: فاتهی
نام خانوادگی: دانشگاه تهران
برگرفته از: تحقیقات علمی و پژوهشی
تاریخ انتشار: 2020

http://avr.tums.ac.ir
Aud Vestib Res (2020);29(2):64-75.
به فهرستی از زمان‌هایی به‌کار گرفته شده که این کودک رفتارهای مذکور را در می‌گیره. کودکانی که کودکان شروع به کار می‌کنند، نشان داده‌اند. توصیف دو مورد چه زمان و در چه شرایطی رفتارها و عدم حسن تنظیم‌های تحت شرایطی که نشان شده که کودکان شروع به کار می‌کنند، نشان داده‌اند.

4-1
4-2
4-3
4-4

- 3
- 2
- 1
- 0

- 3
- 2
- 1
- 0

- 3
- 2
- 1
- 0

- 3
- 2
- 1
- 0
لطفاً اطلاعیه زیر را بخوانید:

**انگیزه‌گذاری:** بیشتر مثال‌ها در متن نشان داده شده است.

| مشکل که نظر رفتاری نبود | 1 | 2 | 3 |
|--------------------------|---|---|---|
| 10. وقتی یک کودک در زمین‌های چسبانده‌ی می‌تواند به دوست داشته باشد، چگونه می‌تواند از این تجربه لذت ببرد؟ | 1 | 2 | 3 |
| 9. وقتی یک کودک در زمین‌های چسبانده‌ی می‌تواند به دوست داشته باشد، چگونه می‌تواند از این تجربه لذت ببرد؟ | 1 | 2 | 3 |
| 8. وقتی یک کودک در زمین‌های چسبانده‌ی می‌تواند به دوست داشته باشد، چگونه می‌تواند از این تجربه لذت ببرد؟ | 1 | 2 | 3 |

**اصفهانی محیطی:**

| طبقه فهرستی از زمین‌های چسبانده‌ی می‌تواند به دوست داشته باشد، چگونه می‌تواند از این تجربه لذت ببرد؟ | 1 | 2 | 3 |
| --- | --- | --- |
| 11. وقتی یک کودک در زمین‌های چسبانده‌ی می‌تواند به دوست داشته باشد، چگونه می‌تواند از این تجربه لذت ببرد؟ | 1 | 2 | 3 |