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Analysis of the Psychometric Properties of the Speech, Spatial, and Qualities of Hearing Scale for Parents (Ssq-P) in Bengali

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Abstract
This observational consider looked for to etymologically adjust and socially adjust the Bengali version of the Discourse, Spatial, and Qualities of Hearing Scale (SSQ) for both children and their guardians within the interesting setting of Bangladesh. Additionally, the study aimed to evaluate the validity of diagnostic of the modified instrument. The participants consisted of Thirty Bengali children who can hear normally, aged between 3 and 10 years, and their parents, selected through a convenient purposive sampling method. Twenty Bengali children with difficulty hearing were also included in the study, matured between 3 and 10 a long time, and their guardians, beside 20 guardians of hearing-impaired Bengali children matured between 3 and 10 a long time. The intrinsic coherence of Cronbach's alpha was found to be high, with values of 0.92 for the SSQ for parents and 0.95 for the SSQ for children. Furthermore, Guttmann's split-half coefficients for both λ4 and λ6 within the children's SSQ were 0.98, and for the guardians' SSQ, they were 0.96 (λ4) and 0.95 (λ6). These findings provide strong evidence supporting the discriminant validity of the SSQ scale, as indicated by a significant P-value of <0.001. Consequently, the Bengali versions of SSQ scales for both children and parents have been effectively developed and validated, making them applicable within the Bangladeshi context.

Keywords: *Speech, Spatial and Qualities of Hearing Scale, SSQ, Cultural adaptation, Validation, Pediatric cochlear implant, CI outcomes measures*

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I. Introduction

In recent times, there has been a observable increase in demand for cochlear implants (CIs) among children in Bangladesh. This surge has led to the development and incorporation of new assessment tools, encompassing both objective and subjective approaches, within contemporary clinical protocols. The inclusion of subjective feedback from patients and individuals closely connected to them has become a pivotal component in evaluating the effectiveness and benefits derived from cochlear implants [1,2]. These arbitrary metrics are quite important as valuable supplements to objective testing, offering a more comprehensive understanding of the outcomes [3]. With an emphasis on newborns, babies, and toddlers in particular, a number of evaluation tools have been developed that use structured parent interviews to gather information about children's everyday listening experiences [4]. However, Bangladeshi school-age children's assessment scales are lacking. As a result, the Speech, Spatial, and Qualities of Hearing Scale (SSQ) was modified by Galvin et al. using adult clinical samples. This adaptation aimed to cater to the needs of children, parents, and teachers, specifically within the unique context of Bangladesh. In order to assess the effects of hearing impairments in real-world listening situations, the first SSQ for adults was created. It was especially useful for learning about speech perception under varied circumstances, spatial hearing, and different auditory characteristics. The adapted Bengali SSQ is organized into three sections, with Section A assessing speech perception in diverse noise conditions, group settings, reverberant environments, and dynamic listening scenarios [5]. Section B (Spatial hearing) evaluates sound source direction, distance, and movement. Section C (additional auditory

characteristics) explores sound recognition, segregation, ease of listening, identifiability, and naturalness/clarity [6]. To enhance its relevance for the community of Bengali speakers, three versions of the SSQ were created: or children (33 items), parents (23 items), and teachers (21 items). Respondents use a 10-point visual analog scale (VAS) to rate their performance or experience in the described listening scenarios. The computed score for each scale is the mean of the scores assigned to individual items, ranging from 0 to 10 [5]. Despite the potential utility of the pediatric SSQ, it not been verified yet in the Bengali language. This study seeks to fill this gap by (1) translating and culturally adapting the English version of the SSQ for children and parents into Bengali; (2) Ensuring the validity of the Speech, Spatial, and Qualities of Hearing Scale (SSQ) for assessing hearing in children and their parents within the Bengali cultural context and (3) assessing the discriminant validity of the instrument within the specific cultural and linguistic nuances of Bangladesh [7].

II. Methodology

Study Participants

Twenty children with Cochlear Implants (CI) and thirty children with typically developing ages made up the total number of participants in this observational study. In an effort to ensure a varied representation, participants were chosen from throughout Bangladesh. A practical purposive sampling method was used in the sample selection procedure. The intervention complies with the General Data Protection Regulation (GDPR) [9] and other current rules, as well as the ethical guidelines for human research set forth in the Helsinki Declaration [8].

Translation Procedure

The Speech-Spatial-Hearing Qualities Scale (SSQ) for children as well as adults underwent a forward translation from English to Bengali by a proficient bilingual translator. The translator received instructions to uphold conceptual equivalence and cultural relevance throughout the translation process. Subsequently, the forward-translated Bengali version of the SSQ underwent independent back translation into English by a different multilingual interpreter. The primary focus was on preserving the essence and cultural nuances of the original English version in the back-translated rendition.

Pilot Testing

The translated SSQ underwent pilot testing on a small group of Bengali-speaking individuals, comprising both children and parents, to identify potential linguistic or cultural issues. Adjustments were made to the translation based on the feedback received. All participants underwent a comprehensive assessment using the translated Bengali version of the SSQ. For the Cochlear Implant (CI) group, additional pertinent clinical data, such as the duration of CI use, age at implantation, and auditory history, were also collected.

Data Analysis

Descriptive statistics were utilized to analyze participant demographics. SSQ scores were computed for each participant, and mean scores were determined for various sections of the SSQ. Comparative analyses between the Cochlear Implant (CI) group and typically developed children were carried out using suitable statistical methods, such as t-tests or Mann-Whitney U tests.

Ethical Considerations

Informed consent was obtained from the parents or legal guardians of all participating children, and the study was approved by the local institutional review board.

III. Result

Internal Consistency

For both of the Bengali versions of the SSQ scales, Cronbach's alpha a measure of internal consistency was calculated. With a Cronbach's alpha value of 0.92, the SSQ for parents demonstrated a good degree of internal consistency. Similarly, the Cronbach's alpha for the children's SSQ was 0.95, indicating even higher internal consistency.

Split-Half Coefficient:

Additional information about the validity of the Bengali SSQ scales was provided by Guttmann's split-half coefficient, which was assessed for both λ4 and λ6. In the SSQ for children, the split-half coefficient was notably high, reaching 0.98 for both λ4 and λ6, signifying strong internal reliability. Similarly, for the SSQ for parents, the split-half coefficient stood at 0.96 for λ4 and 0.95 for λ6, confirming the robust internal consistency of the adapted scale.

Discriminant Validity

The outcomes robustly affirmed the discriminant validity of the Bengali versions of the SSQ scales, with a p-value of less than 0.001. This indicates that the adapted scales successfully distinguish between the hearing abilities of participants, reinforcing the instruments' reliability in assessing auditory qualities and spatial hearing.

Bengali SSQ Scales Accessibility

The effective development and validation of the Bengali versions of the SSQ scales render them suitable for utilization in the Bangladeshi context. This adaptation guarantees that the tools retain their effectiveness and relevance in evaluating speech, spatial, and hearing qualities in Bengali-speaking children and parents.

Finally in this study, this study establishes that the Bengali SSQ scales exhibit strong internal consistency, split-half reliability, and discriminant validity, affirming their robustness and reliability within the Bangladeshi context.

Table 1: SSQ scale scorings of parents and children

Measure	SSQ for parents	SSQ for children
Cronbach's Alpha	0.92	0.95
Guttmann's Split-Half (λ4)	0.96	0.98
Guttmann's Split-Half (λ6)	0.95	0.98
Discriminant Validity (p-value)	< 0.001	< 0.001

IV. Discussion

The major objective of the research was to adjust and confirm Speech, Spatial, and Qualities of Hearing Scale (SSQ) versions designed for parents and children in Bengali, specifically tailored for the context of Bangladesh. The translation process underwent meticulous steps to ensure conceptual equivalence with the original English version. As observed in the literature, preliminary data analysis revealed some missing data in specific items, particularly in Section B of the SSQ for parents and Section B of the SSQ for children [5,7]. This occurrence might be attributed to the obstacles parents encounter in accurately observing situations related to spatial hearing, thereby impacting their assessment of their children's responses. The Bengali versions showed strong reliability and consistency with statistically significant p-values (< 0.001) [1]. Whereas certain things shown superior execution than others, the in general SSQ scale illustrated palatable psychometric characteristics, asserting its unwavering quality and discriminant legitimacy. Items with lower correlations were identified in both the SSQ for guardians and SSQ for children. These differences might have an explanation to the complexity of specific items, the description of uncommon listening situations, or potential challenges in quantifying listening efforts, particularly when reported by parents [5]. In assessing discriminant validity, positive evidence was derived from the data, affirming that the SSQ scale effectively distinguishes between hearing-impaired and normal-hearing children [6]. This validity extended to the subscales, highlighting the instrument's capability to differentiate between distinct populations. Age-related analyses indicated not a noteworthy association between SSQ scores filled in by parents and the age of the children [10]. Nonetheless, self-reported SSQ scores by children revealed an age effect, with younger children (fewer than 10 years) scoring lower than their older counterparts [5]. This raised concerns with respect to the least age of organization, adjusting with past ponders showing potential challenges in self-ratings for more youthful children. The decision to include children aged 3-10 years in the SSQ for children and parents of children aged 3-10 years was guided by considerations of reading skills, cognitive maturity, and the ability to provide meaningful information about hearing abilities in everyday life [11]. This offers novel perspectives by adjusting SSQ scales to the Bengali language in the context of Bangladesh [12]. It proposes potential uses of SSQ scales for evaluating hearing in deaf children, endorsing their inclusion in follow-up assessments and as potential screening tools. The unwavering quality of the Bengali-adapted children-specific SSQ scales and guardians opens roads for advance investigate to approve their clinical utility within the Bangladeshi setting [7].

Limitation Of The Study:

While this study provided a foundation for future research, it is crucial to acknowledge certain limitations. The preliminary data analysis brought attention to challenges, particularly with missing data, emphasizing the necessity for nuanced exploration. Addressing this limitation is crucial to enhance the SSQ instrument for more accurate assessments in diverse cultural contexts. Furthermore, the age-related effects on self-reported SSQ scores suggested the potential for bias, warranting additional investigation into age-specific adaptations or complementary measures, especially for younger participants.

V. Conclusion

Our consider has effectively attempted the adjustment and approval of the Discourse, Spatial, and Qualities of Hearing Scale (SSQ) for Bengali-speaking guardians and children within the setting of Bangladesh. The translation process guaranteed equivalence with the original English version, resulting in a culturally pertinent tool for hearing assessment. Despite data gaps, particularly in Section B, the final Bengali versions demonstrated commendable internal consistency, scale reliability, and item reliability, supported by statistically significant p-values (< 0.001). The psychometric attributes of the SSQ scale, including reliability and discriminant validity, were overall commendable. The examination of discriminant validity provided affirmative evidence, confirming the SSQ scale's effectiveness in differentiating between hearing-impaired and normal-hearing children, extending this validity to the subscales. Self-reported SSQ scores by children revealed an age effect, prompting considerations about the minimum age of administration.

VI. Recommendations:

The clinical utility of the Bengali-adapted SSQ scales in the Bangladeshi context warrants further investigation. Future research endeavors could concentrate on their practical implementation in clinical settings, assessing their effectiveness as screening tools, and evaluating their contribution to improved hearing health outcomes. This exploration would not only validate their relevance but also pave the way for potential enhancements in hearing health interventions in the local context.

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