

Reliability and Validity of the Translated Gujarati Version of Short Sensory Profile (SSP) for Children having Autism Spectrum Disorder

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DOI: <https://doi.org/10.52403/ijhsr.20250515>

ABSTRACT

Introduction: Autism is a neurodevelopmental disorder characterized by difficulties in social interaction and communication, along with distinct restricted and repetitive behaviours. Short Sensory Profile (SSP) is one of the most commonly used tools for assessing sensory characteristics in children with autism spectrum disorder (ASD). While parents typically complete Short Sensory Profile (SSP), the increasing number of working parents has led to grandparents and caregivers often taking on this responsibility. Since this scale is not available in Gujarati, there is a need to develop one that can be used by Gujarati-speaking individuals.

Materials and Methods: An observational study was conducted in Ahmedabad, where a scale was translated into Gujarati using a double forward and backward translation method. Experts reviewed each question, categorizing them as accepted, rejected, or accepted with modifications. A harmonized version of the scale was developed. The study included a sample of 12 participants of both genders diagnosed with ASD. The scale underwent assessments for face and content validity, internal consistency, and test-retest reliability.

Result: In the validation process of Gujarati version of SSP, 7 sections and a total of 38 questions existed. The Gujarati version of the SSP has high internal consistency (Cronbach's $\alpha=0.807$) and test-retest reliability (intra-class correlation coefficient=0.807, 95%. The content validity was assessed, providing data that included S-CVI/AVE and S-CVI/UA values of 0.99 and 0.86, respectively.

Conclusion: The translation of SSP into a Gujarati version was successful in preserving the semantic and measurement properties of the original version and was valid and reliable scale for the Gujarati population.

Keywords: Translation, Short Sensory Profile, Validity, Autism

INTRODUCTION

Growing recognition of the potential etiological factors associated with autism spectrum disorder (ASD) has led to increased discussion within both scientific and public domains. Despite this growing

awareness, the precise pathophysiology of ASD remains only partially understood.^[1] The complexity of ASD is further compounded by its evolving diagnostic criteria, its highly heterogeneous clinical presentation, and ongoing debates regarding

the underlying biological, cognitive and environmental mechanisms that contribute to its manifestation.^[1] These factors create challenges in establishing a unified framework for understanding ASD across different levels of analysis, from genetic and neurological perspectives to behavioural and social aspects.^[2]

ASD is primarily characterized by deficits in social interaction and communication, along with restricted,^[2] repetitive and stereotyped behaviours that often manifest early in development. Beyond these core features, research has increasingly highlighted the role of sensory processing differences in individuals with ASD. Children and adolescents with the condition frequently display atypical responses to sensory stimuli, which can range from hypersensitivity to certain sounds or textures to diminished responsiveness to external sensory inputs. These sensory processing differences may significantly impact daily functioning, social engagement and overall quality of life, further emphasizing the need for continued research into the neurobiological and environmental factors that shape ASD.^[3]

Children on the autism spectrum often exhibit atypical sensory processing, which may manifest as hypo-responsiveness (reduced sensitivity) or hyper-responsiveness (heightened sensitivity) to sensory stimuli. These sensory differences can vary both across and within different sensory modalities,^[4,8] leading to diverse sensory experiences among individuals with autism. Such sensory processing challenges can significantly impact daily functioning, influencing various aspects of life, including engagement in activities, school performance and social interactions. Additionally, these atypical sensory responses have been linked to heightened anxiety, an increase in challenging behaviours and adverse effects on cognitive development.^[5,8]

Furthermore, specific sensory response patterns have been associated with distinct behavioural and developmental outcomes.

Hypo-responsivity or diminished sensitivity to sensory input, has been correlated with lower developmental progress in young children.^[6,8] In contrast, hyper-responsivity, characterized by an exaggerated reaction to sensory stimuli, has been linked to reduced participation in activities and lower social competence.^[7,8] These associations highlight the critical role of sensory processing in shaping the experiences and developmental trajectories of individuals with autism, underscoring the need for targeted interventions and further research in this area.

The Short Sensory Profile (SSP) is a condensed version of Dunn's Sensory Profile caregiver questionnaire,^[9,11] originally designed as a screening tool to identify children with sensory processing difficulties.^[10,11] Developed to assess sensory-related challenges, the SSP consists of 38 items, which are categorized into seven subscales: tactile sensitivity (7 items in TAC), taste/smell sensitivity (4 items in TSM), movement sensitivity (3 items in MOV), underresponsive/seeking sensation (7 items in USS), auditory filtering (6 items in AFL), low energy/weak (6 items in LEW), and visual/auditory sensitivity (5 items in VAS).

The reliability of each subscale in the English version of the SSP was evaluated by calculating Cronbach's alpha using a sample of 117-children ($\alpha = 0.82-0.89$).^[11] The total SSP score, along with individual subscale scores, is used to classify a child's sensory processing differences into one of three categories: typical difference, probable difference, or definite difference. This classification is based on score percentiles derived from a large normative sample of children without disabilities.

MATERIALS & METHODS

An observational methodological study was conducted in Ahmedabad, Gujarat, India, after obtaining approval from the Institutional Ethical Approval Committee. The study was divided into two main phases: translation and validation. Each

phase was carefully structured to minimize bias and ensure reliable results. Before initiating the process, permission was obtained from one of the original authors, Daniel N. McIntosh.

The translation of the Short Sensory Profile (SSP) from English to Gujarati followed a standardized forward-backward translation approach to maintain linguistic accuracy and preserve the original meaning. Initially, two independent native Gujarati speakers carried out the translation—one with expertise in healthcare terminology and the other without. A consensus version was then

created by combining both translations. This version was subsequently back-translated into English by two professional translators to ensure consistency with the original text. The translated versions were then reviewed by a panel of experts, including health professional, language professional and researcher methodologist, who evaluated each item based on clarity, accuracy, and cultural appropriateness. Items were categorized as accepted, accepted with modification, or rejected, with feedback incorporated accordingly.

| MEMBERS | YEARS OF EXPERIENCE |
|---|---------------------------------------|
| Clinical Physiotherapist (1) | 3 years |
| Academicians (8) | 10 years |
| Language Professional (2) (English & Gujarati) | Both having >8 years of experience |
| Research (1) | 13 years |

To assess the clarity of the translated questionnaire, a pre-final version was tested with caregivers of five children diagnosed with Autism Spectrum Disorder. For the validation phase, a sample size of 12 participants was determined, with individuals selected randomly from Ahmedabad. Participants included children between the ages of 6 and 13 years, of both genders, diagnosed with Autism Spectrum Disorder (ASD). Additionally, their primary caregivers were required to have proficiency in reading, writing, and understanding the Gujarati language. Children with any neurodevelopmental or psychological disorders other than ASD were excluded from the study. Furthermore, primary caregivers who lacked the ability to read, write or understand Gujarati were not eligible for participation. Participants who met the eligibility criteria were informed about the study's objectives and methodology and a written informed consent was obtained. Caregivers were then asked to complete the SSP questionnaire while ensuring they understood the items correctly.

Responses were recorded and analysed, with confidentiality assured to all participants. To assess test-retest reliability, the same questionnaire was administered again after one week, and the responses were compared. The completed questionnaires were examined for missing responses and potential language difficulties. No significant issues were identified, confirming that the translated version was clear and comprehensible. After further discussions among translators and experts, the final Gujarati version of the SSP was approved. Statistical validation, including test-retest reliability and internal consistency, was conducted using SPSS version 20.

RESULT

All 38 items included in the SSP questionnaire were validated for identifying children with sensory processing difficulties. Reliability assesses the consistency of measurement results, even when administered multiple times. The test-retest reliability of the Gujarati version of the SSP was evaluated using Intraclass Correlation Coefficients (ICC) with a 95%

confidence interval, while internal consistency, reflecting the homogeneity of the questionnaire; was assessed using Cronbach's alpha. The findings indicated that the Gujarati SSP demonstrated high internal consistency and test-retest

reliability, with Cronbach's $\alpha = 0.8070$ and an ICC of 0.8070. The content validity was assessed, providing data that included S-CVI/AVE and S-CVI/UA values of 0.99 and 0.86, respectively.

| Intraclass Correlation Coefficient | | | |
|------------------------------------|------------------------|-------------------------|-------------|
| | Intraclass Correlation | 95% Confidence Interval | |
| | | Lower bound | Upper bound |
| Single Measures | 0.099 | 0.039 | 0.270 |
| Average Measures | 0.807 | 0.609 | 0.933 |

| Reliability Statistics | | |
|------------------------|--|--------------|
| Cronbach's Alpha | Cronbach's Alpha Based on Standardized Items | No. of Items |
| 0.807 | 0.774 | 38 |

DISCUSSION

The present study was conducted to fulfil the need for a standardized and culturally relevant instrument to identify sensory processing difficulties in children, particularly those diagnosed with Autism Spectrum Disorder (ASD). Sensory processing challenges are prevalent among children with ASD, and early identification plays a crucial role in implementing appropriate interventions. The Short Sensory Profile (SSP) is a well-established, caregiver-reported questionnaire that has been widely used in both clinical and educational settings to assess sensory processing patterns in children. Given its significance, it is essential to ensure that the tool is accessible to diverse linguistic populations by developing validated translations that maintain the integrity of the original scale.

To make the SSP accessible to Gujarati-speaking individuals, a systematic translation and adaptation process was undertaken. Cultural and linguistic adaptation is necessary to preserve the meaning and intent of the original items while ensuring that the translated version remains relevant to the target population. During the validation process of the Gujarati version, extensive discussions were carried out regarding the translation and contextual application of specific questionnaire items. Every effort was made to maintain the

content validity of the scale by ensuring that the translated items accurately reflected the constructs measured in the original SSP.

The primary objective of this study was to develop a reliable and valid Gujarati version of the SSP through a rigorous translation and adaptation methodology. The translation process followed established guidelines, including forward and backward translation, expert committee review and pre-testing with a sample of the target population. Throughout the translation phase, no significant difficulties were encountered and the structure of the original SSP was carefully preserved. All items from the original scale were retained without any modifications to their sequence and none of the items were excluded. This approach ensured that the translated version maintained the same measurement properties as the original SSP.

Findings from the study indicated that there was a notable increase in SSP scores following the intervention, suggesting that the translated version effectively captured changes in sensory processing patterns. These results align with previous research, such as the study conducted by Zachary J. Williams et al. (2018), which evaluated the reliability of each SSP subscale using Cronbach's alpha in a sample of 117 children. The study reported reliability coefficients ranging from 0.82 to 0.89,

highlighting the strong internal consistency of the SSP.

Future research should aim to expand the sample size to improve the generalizability of findings and include participants with various sensory processing conditions beyond ASD. Additionally, further studies could explore the association between the Gujarati version of the SSP and other functional outcome measures to establish its concurrent validity. Longitudinal studies may also be beneficial in assessing the tool's effectiveness in tracking sensory processing changes over time. By continuing to validate and refine the SSP in different linguistic and cultural contexts, researchers and clinicians can ensure that sensory processing assessments remain inclusive and applicable to diverse populations.

CONCLUSION

The process of translating the Short Sensory Profile (SSP) into the Gujarati language was carried out successfully while ensuring that the semantic meaning and measurement properties of the original scale remained intact. The translated version underwent rigorous validation procedures to confirm its accuracy, cultural relevance, and applicability to the Gujarati-speaking population. The findings of the study indicate that the Gujarati version of the SSP is both a valid and reliable tool for assessing sensory processing difficulties in children. Its strong psychometric properties suggest that it can be effectively utilized in clinical, educational, and research settings to evaluate sensory processing patterns among Gujarati-speaking individuals. By maintaining the integrity of the original scale while adapting it to a new linguistic and cultural context, this translation provides an essential resource for professionals working with children who experience sensory challenges. This serves as a valuable tool for both primary caregivers and grandparents in effectively supporting children with sensory processing difficulties.

Declaration by Authors

Ethical Approval: Approved

Acknowledgement: The authors express their gratitude to Winnie Dunn for granting permission to translate the SSP scale into Gujarati. We sincerely appreciate the support of senior faculty members for their assistance in the validation process. A heartfelt thank you also goes to all the participants for their valuable support and active involvement in the study.

Source of Funding: None

Conflict of Interest: The authors declare no conflict of interest.

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- How to cite this article: Tisa Rasania, Mansee Desai. Reliability and validity of the translated Gujarati version of short sensory profile (SSP) for children having autism spectrum disorder. *Int J Health Sci Res*. 2025; 15(5):116-121. DOI: <https://doi.org/10.52403/ijhsr.20250515>
