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# SENSORY PROCESSING AND PARTICIPATION AMONG CHILDREN WITH AUTISM SPECTRUM DISORDER: A CROSS-SECTIONAL STUDY

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## ABSTRACT

Autism Spectrum Disorder (ASD) is commonly associated with sensory processing differences that may influence children's participation in everyday activities. Although sensory modulation difficulties are widely reported in ASD, limited evidence exists regarding their direct relationship with occupational participation among school-aged children. This study aimed to examine sensory processing patterns and occupational participation and to explore the relationship between these variables among school-going children with ASD aged 6–12 years. A quantitative cross-sectional survey design was adopted, and 100 children diagnosed with ASD were recruited using purposive sampling. Sensory processing patterns were assessed using the Child Sensory Profile–2 (SP-2) Caregiver Questionnaire, while occupational participation was evaluated using the Child and Adolescent Scale of Participation (CASP). Descriptive statistics were used to summarize demographic characteristics and scale scores, and Spearman correlation analysis was performed to examine associations between sensory processing patterns and occupational participation. The findings revealed that children with ASD demonstrated atypical sensory processing patterns across all sensory quadrants and domains. Occupational participation was relatively higher at home settings and comparatively restricted in school and community contexts. Correlation analysis showed weak and non-significant associations between sensory processing patterns and

occupational participation across CASP domains. These results indicate that although sensory processing differences are prevalent among children with ASD, they may not independently determine participation outcomes. Occupational participation is influenced by sensory, environmental, and contextual factors. The findings emphasize the importance of participation-focused interventions to support meaningful engagement in daily life activities for children with ASD.

**Keywords: Autism Spectrum Disorder; Sensory Processing; Occupational Participation; Sensory Profile; Child and Adolescent Participation**

## INTRODUCTION

Autism Spectrum Disorder (ASD) is a pervasive neurodevelopmental condition characterized by persistent difficulties in social communication and interaction, along with restricted interests and repetitive patterns of behaviour **[1]**. These core characteristics significantly impact multiple domains of functioning, including learning, adaptive behaviour, and participation in everyday activities. During the school-going years (6–12 years), children encounter increasing academic, social, and environmental demands. For children with ASD, these demands often highlight limitations in occupational participation across home, school, and community contexts.

Early manifestations of ASD are predominantly social and include atypical eye contact, delayed development of verbal and non-verbal communication skills, reduced social reciprocity, and limited peer interaction **[2]**. Although early and intensive intervention has been shown to improve adaptive functioning and long-term outcomes, participation restrictions continue to be evident in many children with ASD **[3]**. These restrictions cannot be attributed solely to social and communication deficits, indicating that additional factors play a role. Sensory processing differences have been identified as one such critical factor influencing functional engagement and participation.

Repetitive and restricted behaviours are an essential component of ASD and frequently coexist with sensory processing differences **[1]**. Sensory processing refers to the neurological ability to receive, modulate, discriminate, and integrate sensory information from the environment to support adaptive responses **[4]**. Children with ASD commonly exhibit atypical sensory responses across multiple modalities, including tactile, auditory, visual, vestibular, proprioceptive, gustatory, and olfactory systems **[5]**. These sensory differences may interfere with attention, emotional regulation, motor coordination, learning, and behaviour.

Atypical sensory processing in ASD may present as hyper-responsivity, hypo-

responsivity, or sensory-seeking behaviours **[6]**. Hyper-responsivity involves exaggerated responses to sensory stimuli, often resulting in avoidance or distress, whereas hypo-responsivity is characterized by reduced awareness or delayed responses to sensory input. Sensory-seeking behaviours involve an increased desire for sensory experiences and may disrupt engagement in daily activities if not appropriately supported. Dunn's model of sensory processing describes these patterns as interactions between an individual's neurological threshold and behavioural response strategies **[7]**. Sensory processing impairments can negatively affect higher-level integrative functions such as praxis, social interaction, and occupational participation.

Occupational participation refers to involvement in meaningful activities within daily life contexts. For school-going children, this includes self-care routines, academic tasks, play, leisure, and social participation. The International Classification of Functioning, Disability and Health (ICF) identifies participation as a key health outcome influenced by the interaction between individual capacities and environmental demands **[8]**. Evidence indicates that children with ASD participate in fewer leisure and daily activities compared with typically developing peers **[9]**, and sensory processing difficulties contribute to these reduced participation patterns **[10]**. Research also shows that sensory processing challenges are associated with decreased social participation and engagement in activities that involve communication, interaction, and environmental adaptation **[9]**.

Despite growing recognition of sensory processing differences in ASD, there remains limited research examining the direct relationship between sensory processing patterns and occupational participation in school-aged children. Understanding this relationship is essential for occupational therapists to develop targeted, occupation-based, and contextually relevant interventions. Therefore, the present study aims to examine the relationship between sensory processing patterns and occupational participation among children with ASD aged 6–12 years.

**OBJECTIVES**

- To assess sensory processing patterns in children with ASD aged 6–12 years
- To determine the level of participation among children with ASD across home, school, and community contexts
- To examine the association between sensory processing patterns and

occupational participation in children with ASD.

**METHODOLOGY**

A quantitative, cross-sectional survey design was adopted to examine the relationship between sensory processing patterns and occupational participation among school-going children with ASD. The study population comprised children diagnosed with ASD, aged 6–12 years, including both boys and girls, who were attending school and/or receiving therapeutic services at the time of data collection.

A total of 100 children with ASD were recruited using a purposive sampling method based on the inclusion and exclusion criteria. Children with a confirmed diagnosis of ASD and whose parents or caregivers provided informed consent were included in the study. Children with severe uncorrected visual or hearing impairments, or with major neurological or medical conditions that could significantly limit occupational participation, were excluded.

Sensory processing patterns were assessed using the Child Sensory Profile–2 (SP-2) Caregiver Questionnaire, a standardized caregiver-reported measure that evaluates children's responses to sensory input across multiple sensory domains and categorizes behaviours into sensory seeking, sensory avoiding, sensory sensitivity, and low registration patterns **[11]**. Occupational participation was assessed using the Child and Adolescent Scale of Participation (CASP), which measures children's involvement in age-appropriate activities across home, school, and community contexts in comparison with same-aged peers and is grounded in the International Classification of Functioning, Disability and Health framework **[12]**.

Before data collection, ethical approval was obtained from the Institutional Ethics Committee, and the study was conducted in accordance with the ethical principles outlined in the Declaration of Helsinki. Parents or caregivers of eligible children were informed about the purpose and procedures of the study, and written informed consent was obtained before participation. Caregivers completed a brief demographic and clinical information form, followed by the SP-2 and CASP questionnaires. All completed questionnaires were reviewed for completeness and scored according to standardized guidelines provided in the respective test manuals.

The collected data were coded and entered into statistical software for analysis. Descriptive statistics were used to summarize demographic characteristics and scale scores. The association between sensory processing patterns and occupational participation was examined using Spearman correlation analysis, as the data were not normally distributed.

Confidentiality of participant information was maintained throughout the study, and participation was voluntary, with parents or caregivers having the right to withdraw at any time without any consequences.

**Table 1: Demographic Characteristics of the Study Sample (n = 100)**

| Variable | Category | Frequency (n) | Percentage (%) |
|---|---|---|---|
| Age (years) | 6 | 41 | 41.0 |
| | 7 | 38 | 38.0 |
| | 8 | 11 | 11.0 |
| | 9 | 4 | 4.0 |
| | 10 | 5 | 5.0 |
| | 11 | 1 | 1.0 |
| Gender | Boys | 65 | 65.0 |
| | Girls | 35 | 35.0 |
| School Type | Normal school | 88 | 88.0 |
| | Special school | 4 | 4.0 |
| | Not enrolled | 8 | 8.0 |
| Board of Education | Matriculation | 65 | 65.0 |
| | State Board | 14 | 14.0 |
| | International Board | 13 | 13.0 |
| | Not specified | 8 | 8.0 |

The study sample comprised 100 school-going children with Autism Spectrum Disorder aged 6–12 years, with a mean age of 6.97 ± 1.14 years. Boys constituted 65% of the sample. The majority of children were enrolled in regular schools (88%) and most followed the Matriculation board of education (65%), followed by State Board and International Board schools.

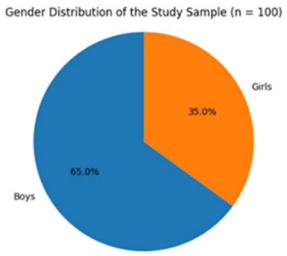


**Figure 1: Age-wise distribution of the participants**

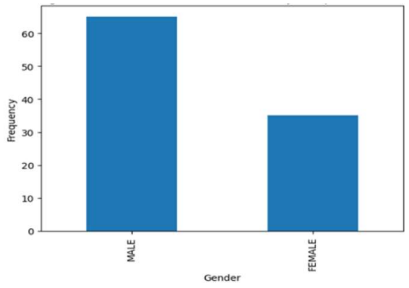


**Figure 2: Gender distribution of the participants**

**Table 2: Sensory Profile Scores of participants (n = 100)**

| Variables | Mean | Std. Deviation |
|---|---|---|
| Seeking | 55.23 | 10.97 |
| Avoiding | 55.58 | 11.85 |
| Sensitivity | 51.40 | 9.22 |
| Registration | 52.77 | 10.72 |
| Auditory | 24.67 | 7.06 |
| Visual | 14.73 | 3.91 |
| Touch | 24.65 | 6.20 |
| Movement | 21.96 | 5.36 |
| Body Position | 15.59 | 5.44 |
| Oral | 26.23 | 8.23 |
| Conduct | 27.37 | 5.40 |
| Social Emotional | 38.64 | 9.69 |
| Attentional | 30.02 | 6.76 |

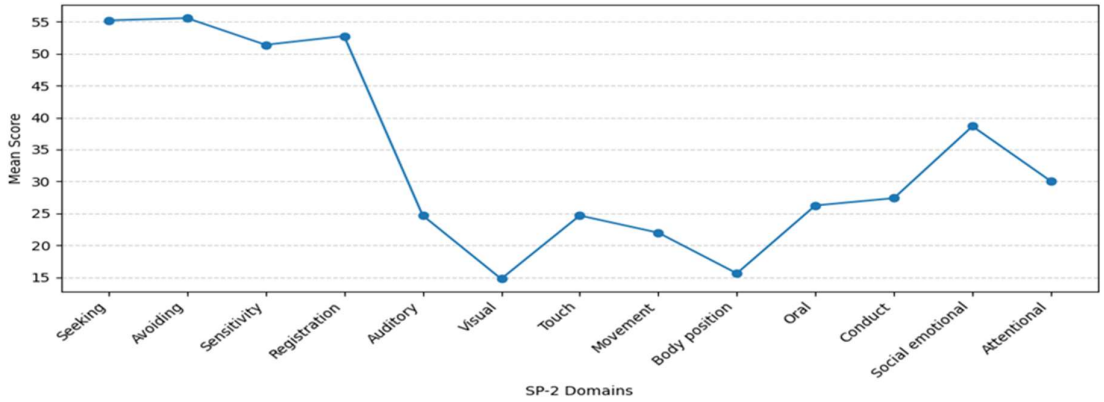


**Figure 3: Sensory Processing Profile Based on SP-2 (n = 100)**

**Table 3: CASP Scores of participants (n = 100)**

| Variables | Median | Range |
|---|---|---|
| Home Participation | 7 | 5.03 – 13.46 |
| Neighbourhood and Community Participation | 6 | 6.93 – 17.27 |
| School Participation | 6 | 5.50 – 21.15 |
| Home and Community Living Activities | 5 | 3.83 – 15.68 |

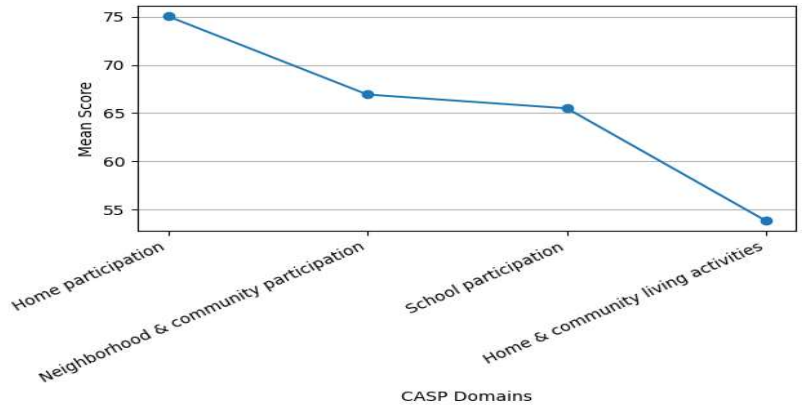


**Figure 4: Occupational Participation Profile Based on CASP (n = 100)**

**Table 4: Correlation between sensory profile and CASP of participants (n = 100)**

| Sensory Profile | Home | Neighbourhood & Community | School | Home & Community | CASP Total |
|---|---|---|---|---|---|
| Seeking | –0.101 | 0.229 | –0.043 | 0.215 | 0.082 |
| Avoiding | 0.025 | 0.265 | 0.014 | 0.081 | 0.106 |
| Sensitivity | –0.133 | 0.108 | 0.030 | 0.049 | 0.010 |
| Registration | –0.180 | –0.175 | –0.080 | 0.045 | –0.129 |
| Auditory | 0.115 | 0.234 | 0.244 | 0.073 | 0.205 |
| Visual | –0.138 | –0.235 | –0.235 | –0.100 | –0.222 |
| Touch | –0.073 | –0.240 | –0.195 | –0.198 | –0.221 |
| Movement | 0.038 | 0.047 | –0.023 | 0.181 | 0.086 |
| Body Position | –0.125 | –0.067 | 0.076 | –0.084 | 0.021 |
| Oral | –0.203 | 0.129 | –0.085 | 0.075 | –0.010 |
| Conduct | –0.122 | 0.114 | 0.028 | 0.317 | –0.013 |
| Social Emotional | 0.023 | 0.238 | –0.001 | 0.075 | 0.086 |
| Attentional | –0.228 | 0.253 | –0.076 | 0.317 | 0.036 |

## DISCUSSION

The present study explored sensory processing patterns and occupational participation among school-going children with ASD aged 6–12 years and examined the relationship between these variables using the Child Sensory Profile–2 (SP-2) and the Child and Adolescent Scale of Participation (CASP). Participation was conceptualized within the International Classification of Functioning, Disability and Health (ICF) framework, which emphasizes involvement in real-life situations as a key outcome of health and functioning **[8]**.

### Sensory Processing Patterns

Findings from the SP-2 revealed that children with ASD exhibited atypical sensory processing patterns across all four sensory quadrants—sensory seeking, sensory avoiding, sensory sensitivity, and low registration. This observation is consistent with earlier evidence indicating that sensory modulation difficulties are highly prevalent in children with ASD and form a core feature of the condition **[11, 12]**. Elevated scores across quadrants reflect variability in neurological thresholds and behavioural responses to sensory input, as described in Dunn's sensory processing framework **[7]**.

Domain-specific analysis revealed challenges across the auditory, visual, tactile, oral, movement, and body-position domains. Similar patterns have been reported in previous studies, which suggest that sensory processing differences in ASD are not confined to a single sensory system but occur across multiple modalities **[11, 13]**. Auditory processing difficulties, in particular, have been consistently highlighted in the literature as a key concern affecting attention, communication, and classroom engagement **[21]**. Tactile and visual sensory modulation difficulties have also been associated with behavioural regulation issues and motor planning challenges **[12, 23]**. These findings support Ayres' theory that impaired sensory integration can influence higher-level functional abilities such as praxis, adaptive behaviour, and social participation **[4]**.

### Participation

Analysis of CASP scores indicated that participation was relatively higher in home contexts compared to school and community environments, with the lowest participation observed in home and community living activities. This pattern aligns with earlier studies reporting that children with ASD tend to participate more in familiar, structured environments and experience greater restrictions in less predictable social and community contexts **[3, 14, 27]**. Reduced participation in school and community settings may be attributed to increased sensory, social, and cognitive demands, as well as environmental barriers

such as noise, crowding, and limited accommodations **[25, 28]**.

Lower participation in home and community living activities suggests challenges in independent engagement in daily routines and instrumental activities, which may be influenced by deficits in executive functioning, adaptive skills, and social communication **[16, 17, 21]**. These findings are clinically relevant, as participation in meaningful occupations is essential for developing autonomy, social competence, and long-term quality of life **[8]**.

**Association Between Sensory Processing and Occupational Participation**

Spearman's rank-order correlation analysis revealed weak and non-significant association between SP-2 domains and CASP domains, as well as between SP-2 total scores and CASP total scores.

These findings are comparable to those reported by Lin, who found that although children with ASD demonstrated both sensory processing differences and participation restrictions, the strength of association between these constructs varied across activity types **[11]**. Similarly, Ghanbari *et al*. reported no statistically significant relationship between sensory processing and participation in daily living activities among school-aged children with autism and normal intelligence **[19]**. Chien and Rodger also observed that while children with sensory processing impairments exhibited lower participation levels, sensory variables explained only a small proportion of variance in participation outcomes **[18]**.

In contrast, other studies have identified significant associations between specific sensory processing patterns and particular participation domains **[21]**. For instance, Loh *et al*. identified auditory filtering as a key sensory predictor of participation limitations, while Hochhauser and Engel-Yeger reported that atypical sensory processing was associated with restricted leisure participation in children with high-functioning ASD **[21]**. The discrepancy between these findings and the present study may be attributed to differences in age range, cultural context, participation measures, and analytical approaches.

Importantly, emerging evidence suggests that occupational participation in ASD is influenced by multiple interacting factors beyond sensory processing alone. Executive functioning, social communication abilities, environmental supports, and parental stress have been shown to significantly contribute to participation outcomes **[16, 17, 25]**. Zingerevich and LaVesser demonstrated that executive functions contributed to school participation beyond the influence of sensory processing, highlighting the multifactorial nature of participation in ASD **[17]**.

**Limitations and Recommendations**

The cross-sectional design limits causal interpretation, and reliance on caregiver-reported measures may have introduced response bias. The study's limited geographic scope may affect generalizability. Future research should adopt longitudinal designs and assess additional factors contributing to occupational participation. Clinically, interventions should emphasize a holistic, participation-focused approach.

**CONCLUSION**

The study identified atypical sensory processing patterns and participation restrictions among school-going children with ASD aged 6–12 years, with relatively greater participation in home settings than in school and community contexts. Correlation analysis revealed weak and non-significant associations between sensory processing patterns and occupational participation, suggesting that sensory processing differences alone may not determine participation outcomes. These findings highlight the need for holistic, participation-focused intervention approaches.

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