



ISSN Print: 2394-7500  
ISSN Online: 2394-5869  
Impact Factor: 8.4  
IJAR 2021; 7(10): 162-165  
www.allresearchjournal.com  
Received: 09-08-2021  
Accepted: 10-09-2021

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## Prevalence of sensory processing Dysfunction in 3-11 years old normal school going children: A cross-sectional study

**Aarti Panchal, Tapasya Khatri, Priyal Nahar, Patel Kruti and Riya Agrawal**

### Abstract

**Background:** Sensory processing disorder (SPD) “affects the way the brain interprets the information that comes in and the response that follows, causing emotional, motor, and other reactions that are inappropriate and extreme.

**Aim:** The purpose of this study is to the prevalence of sensory processing dysfunction in 3-11 years old normal school going children in India.

**Method:** A cross-sectional study design was chosen for this study. A total 400 (M=200, F=200) Subjects were recruited randomly from five different primary schools of Surat, India. Short Sensory Profile (SSP) measure was used to assess the sensory processing dysfunctions.

**Results:** Based on SSP scores, out of 400 children, 29 % (116) showed typical performance, 15.3% (61) probable difference, 55.8% (223) definite difference. The most prevalent sensory processing dysfunctions involved the Low energy/weak (56%), Movement sensitivity (47.8%), tactile sensitivity (46.3%) and Under-responsive/seek sensation (41%)

**Conclusion:** A short sensory profile scores can be used identify the sensory integration deficit in children, which will help to provide appropriate intervention to avoid or minimize any health complications.

**Keywords:** Sensory processing dysfunction (SPD), children, short sensory profile (SSP).

### 1. Introduction

Sensory processing disorder (SPD) “affects the way the brain interprets the information that comes in and the response that follows, causing emotional, motor, and other reactions that are inappropriate and extreme [1-2]” Ayres focused particularly on the identification of different patterns of dysfunction in sensorimotor development and their impact on learning and on the description of adaptive behaviors observed in children with motor clumsiness or learning disabilities of unknown origin [3, 4, 5].

Few functional impairments associated with sensory processing disorders: decreased social skills and participation in play occupations; decreased frequency, duration, or complexity of adaptive responses; impaired self-confidence or self-esteem or both; deficient adaptive or daily life skills; and diminished fine-, gross-, and sensory-motor skill development. The lack of ability to play successfully with peers is proposed to be related to a lack of full participation in sensory and motor play from which cognitive and social skills emerge and develop [6, 7, 8]. SPD can negatively affect development and functional abilities in behavior, emotional, motor, and cognitive domains [9]. Consequently, it is important to detect differences early with appropriate sensory processing assessment tools. (1) Ayres J. was the first to describe sensory problems as the result of an inefficient neurological process. It is estimated that 5-10% of all children have sensory integration deficiencies [10]. Estimated rates of sensory processing disorders for children with various disabilities are 40-88 percent. However, preschool children have prevalence estimates of sensory processing disorder based on parent's perception of 5.3% [11]. Consequently, for early detection of these differences, it is essential to identify the most appropriate and precise tool for assessing sensory processing, to determine whether SI difficulties are a significant factor in a child's behavior and to provide appropriate intervention [1-12].

**2. Material and Method**

**2.1. Study design:** Cross sectional study

**2.2. Sample size:** 400

**2.3. Sample size calculation:** The sample size was taken based on the study where the sample size - 50 was said to be valid per age group [13].

**2.4. Sampling Method:** Simple random sampling

**2.5. Inclusion Criteria**

**Age:** 3-11 years old normal school going children.  
Both Boys & Girls  
Children who have achieved their motor milestones normally. Children whose parents understand English language Children whose parents have access to internet

**2.6. Exclusion Criteria**

Children with any neurological, visual, hearing problems.  
Children taking any permanent medications for any condition. Children with any previous medical history  
Pre-term born children (delivered before 37 weeks of pregnancy) [14].

**2.7. Tests & Material used**

Short Sensory Profile (SSP)

Online Google forms

**2.8. Procedure**

- A Cross sectional study design was chosen for the study. Approval to conduct the study was obtained from the ethics committee, Nirmal hospital, Surat, India prior to commence of the study, after which subjects were randomly selected and screened following the criteria's mentioned under the heading of inclusion and exclusion criteria. Once the screening process was completed by online Google forms and the subjects who were found to be eligible for the present study, a written consent was obtained from the parents of each of the subjects along with the principal of that respective school by signing online consent forms via Google forms.
- A total 400 subject were enrolled in the present study. Subjects were selected from the different areas of the schools. Short sensory profile tool were used to asses sensory processing dysfunctions in normal school going children by filling online Google forms.
- All the children [n=400] were screened using the SSP diagnostic tool for the assessment of sensory processing dysfunction.

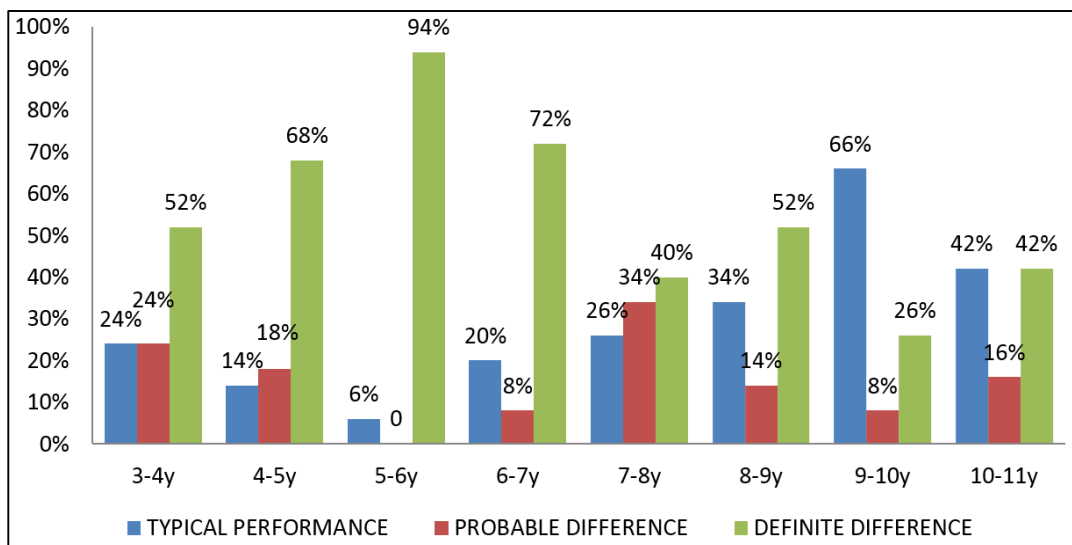
**3. Data Analysis**

A data analysis was done by using SPSS version 20.0. Descriptive statistics i.e. mean, percentage, frequency, standard deviation were analyzed.

**4. Results**

**Table 1:** Represents the Performances scored in short sensory profile in children

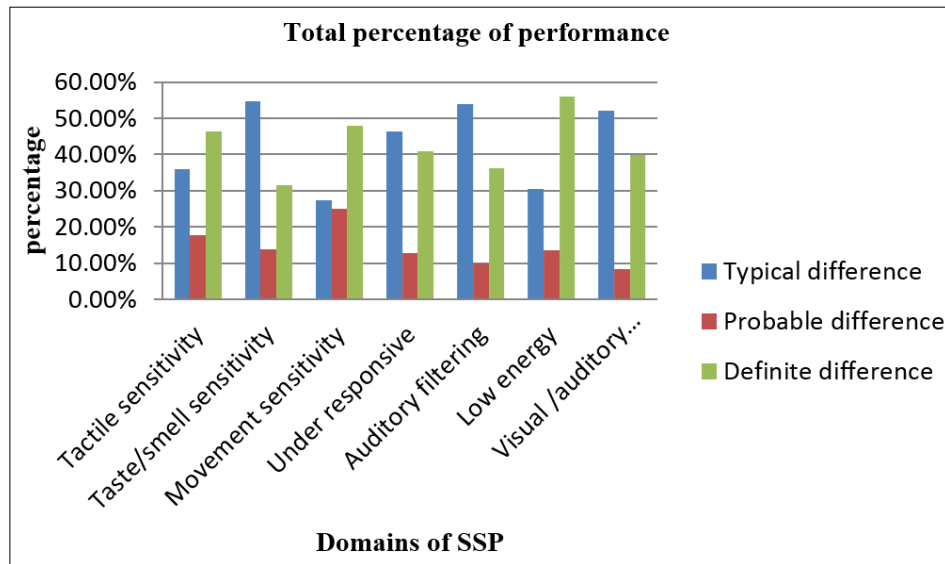
| N=400  | Typical Performance | Probable Difference | Definite Difference |
|--------|---------------------|---------------------|---------------------|
| Age    | Frequency (%)       | Frequency (%)       | Frequency (%)       |
| 3-4y   | 12(24)              | 12(24)              | 26(52)              |
| 4-5y   | 7(14)               | 9(18)               | 34(68)              |
| 5-6y   | 3(6)                | -                   | 47(94)              |
| 6-7y   | 10(20)              | 4(8)                | 36(72)              |
| 7-8y   | 13(26)              | 17(34)              | 20(40)              |
| 8-9y   | 17(34)              | 7(14)               | 26(52)              |
| 9-10y  | 33(66)              | 4(8)                | 13(26)              |
| 10-11y | 21(42)              | 8(16)               | 21(42)              |



**Graph 1:** Percentage of performances scored in short sensory profile in 3-11 years of children

**Table 2:** Total percentage of performance scored in different domains of short sensory profile in 3-11years children. [n=400]

| Domains [n=400]              | Typical difference | Probable difference | Definite difference |
|------------------------------|--------------------|---------------------|---------------------|
| Tactile sensitivity          | [144] 36.0%        | [71] 17.8%          | [185] 46.3%         |
| Taste/smell sensitivity      | [219] 54.8%        | [55] 13.8%          | [126] 31.5%         |
| Movement sensitivity         | [109] 27.3%        | [100] 25.0%         | [191] 47.8%         |
| Under responsive             | [185] 46.3%        | [51] 12.8%          | [164] 41.0%         |
| Auditory filtering           | [215] 53.8%        | [40] 10.0%          | [145] 36.3%         |
| Low energy                   | [122] 30.5%        | [54] 13.5%          | [224] 56.0%         |
| Visual /auditory sensitivity | [208] 52.0%        | [33] 8.3%           | [159] 39.8%         |
| Total SSP                    | [116] 29.0%        | [61] 15.3%          | [223] 55.8%         |

**Graph 2:** Total percentage of performance scored in short sensory profile.

## 5. Discussion

This cross sectional study aimed to establish the Prevalence of Sensory Processing Dysfunction (SPD) in 3-11 years old normal school going children in India.

Results of this study found that (29%) children showed typical performance, (15.3%) children showed probable difference and (55.8%) children showed definite difference. The most prevalent Sensory Processing Dysfunctions involved the Low energy/weak (56%), Movement sensitivity (47.8%), tactile sensitivity (46.3%) and Under-responsive/seek sensation (41%).

The results of the present study is higher than the other studies [15, 16, 17]. USA [16] the possible reason for the disparity of the results could be due to Children from different geographical areas or different cultures who may exhibit differences in their performance, as each culture has its own distinctive pattern of child-learning practices, variable attitudes toward and expectations from children, and different concepts of the behaviors and skills that are to be encouraged in their development [18].

Another reason could be the involvement of other factors, such as culture, child-bearing style, and social experiences as they may also play role in Sensory experiences, sensory integration and processing abilities [19] and the ability of sensory processing continues to grow after the age of 8 years and According to Sensory Integration theory, age difference should affect preschool children [20, 21].

Another finding in the present study for the higher percentage of the (55.8%) definite sensory processing dysfunction in the children, the possible explanation could be homogenous sample size in each age group, and the study was conducted in urban settings and during covid-19 pandemic situation where children spent most of the time at

home and get less opportunity to play outside and explore the environment. Or children are actually suffering from Sensory Processing Dysfunction but it is not hampering their daily routines and academic performance.

### 5.1. Limitation

1. The study was restricted to one city in India.
2. Population recruited for the study had same cultural background. Applicability of results to whole country may not be effective method as it states that culture also has impact on sensory integration.
3. This study does not provide the comparison between the boys and girls.

### 5.2. Conclusion

Most of children fall in probable and definite differences as it hinders active exploration of the environment, impairs daily living activities, poor social participation, socio-emotional maturation, performance in a school. The frequent screening of sensory processing function is needed so we can provide appropriate intervention to avoid or minimize the health complications.

### 5.3. Future Recommendation

1. Different geographical area and cultural background with larger sample size.
2. Multicentric study involving various states of country in all the age groups may give accurate data for the whole country.

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