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The Path to Sensory Readiness: How Age and Gender Influence Sensory Development in Early Childhood

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Abstract

This study examines the sensory readiness in Anganwadi children aged 4–6 years in Kannur district, Kerala. It focuses on the impact of age and gender on sensory readiness, which is crucial for success in a learning environment. The research uses a cross-sectional design with 189 Anganwadi children. A self-designed observational scale was used for collecting the data. Results show high sensory development readiness, with an average score of 84.20 per cent. Gender examination indicates that there is no notable variation in sensory readiness between boys and girls. Age-based evaluation categorises children into four groups—4–4.5, 4.5–5, 5–5.5 and 5.5–6 years. The study found that there were no significant variations in sensory development readiness among these age ranges.

Introduction

Being prepared for school includes a variety of behaviours and abilities necessary for a child to succeed in a learning environment. This state of readiness is arbitrary, subject to individual variation, attainable at different ages and denotes the possession of abilities essential for the educational setting.

Sensory development is typically associated with various senses, including touch, vision, hearing, smell and taste, which allow us to explore our surroundings. Social skills are the abilities we use to interact with others (Doncheva et al., 2023). Sensory processing refers to the way individuals perceive, process and handle sensory information in their surroundings, as explained by Dean et al. (2018). A child with well-developed sensory processing skills is more likely to actively engage in academic, social and play activities by exhibiting appropriate responses to

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stimuli within the classroom setting, as noted by Resch et al. (2019).

These sensory processing abilities play a crucial role in school readiness, serving as the basis for learning, attention, perceptual and behavioural skills, as emphasised by Fazlioğlu and Baran (2008). The role that sensory processing plays in development has drawn more attention in recent decades. Our ability to organise sensory data from the body and environment affects how we interact with our social and physical environments (Blanche & Gunter, 2020). From birth, reflexive motor actions and state regulations are two ways in which sensory processing affects an infant's behaviour (Stein & Rowland, 2011).

Children engage in the process of understanding and learning about their environment by utilising their senses. For effective learning to occur, it is crucial that all their sensory organs perform their functions, transmitting acquired information to the brain. Subsequently, this information needs to be perceived by the short-term memory, imbued with meaning and then processed for commentary or interpretation. The sensory environment encompasses elements within the Early Childhood Care and Education (ECCE) setting that are perceived through the senses. This involves: (1) aspects of the physical environment derived from both indoor and outdoor spaces, including factors like sound, colours, visual exhibits, tactile play materials and temperature; and (2) certain social and temporal elements like disorder and overcrowding in the classroom (Tamblyn et al., 2023).

The existing research does not cover the area of sensory readiness skills in pre-schoolers. The objective of this study is to examine the sensory readiness of Anganwadi children, and its correlation with age and gender.

Methodology

The study titled 'The Way to Sensory Readiness: How Age and Gender Influence Sensory Development in Early Childhood' was conducted during September–November in 2022 in Kannur district, Kerala. The study adopts a cross-sectional design with a random sampling method, aiming to assess readiness in sensory development using a self-designed observational scale questionnaire. The study includes a sample size of 189 Anganwadi children, including both boys and girls within the 4–6 years of age range. The scoring system assigns values of 5, 4, 3, 2 and 1 to Likert scale responses. Descriptive statistics, including mean, standard deviation, coefficient of variation and percentage scores, are calculated for sensory development readiness. Ethical considerations include obtaining informed consent, ensuring confidentiality, and seeking approval from the Child Development Project Officer (CDPO) and Integrated Child Development Scheme (ICDS) supervisors. The study interprets the results of hypothesis tests, providing

Table 1
Mean, Standard Deviation and Z Value for Sensory Development

Variable	N	Mean	Standard Deviation	Mean % score	CV	Z	p value
Sensory Development	189	29.47	4.95	84.20	16.80	8.945	<0.001

insights into sensory development readiness, gender differences and age-related variations.

Results and Discussion

The results and discussions of this study are discussed below.

Readiness in Sensory Development

To evaluate readiness in sensory development, the respondents were asked questions on a five-point Likert scale. The responses were scored as 5 for 'Able to complete', 4 for 'Almost done, but not completed', 3 for 'Partially done', 2 for 'Tried but couldn't do', and 1 for 'Unable to do'. The total score of the questions for all 189 respondents was found out, based on which the mean percentage score of readiness in sensory development was calculated. This score was classified into one of the five groups.

The mean percentage score of readiness in sensory development is 84.20, which indicates that readiness in sensory development is high or excellent. The coefficient of variation is 16.80 per cent, representing the relative variability in sensory development scores compared to the mean. To test whether the sample information that was observed exists in the population or not, and to verify that the readiness in sensory development is high or not, we formulated the hypotheses:

H_0: The readiness in sensory development is equal to 75 per cent of the total score (**H_0:** MPS=75 per cent)

H_1: The readiness in sensory development is more than 75 per cent of the total score (**H_1:** MPS>75 per cent)

To test the above hypotheses, a sample Z test was used; the result is exhibited in Table 1. In the table, the p value is less than 0.05 and Z value is positive, which indicates that the test is significant. Hence, the null hypothesis was rejected and it was concluded that the readiness in sensory development is more than 75 per cent, i.e., excellent.

According to Woodward et al. (2017), sensory functioning was identified as a significant predictor of kindergarten children's readiness for school, as well as their subsequent achievement in mathematics and reading. In contrast to the present study results, Ding et al. (2023) emphasised that the early age

of 3–6 years represents a pivotal period in a child's development, during which a majority of children exhibit mild sensory disorders, particularly involving proprioceptive issues. Proprioception is a sense that lets us perceive the location and movements of our body parts. It is mediated by specialised sense organs (proprioceptors) located within the muscles and tendons. Enhancing these sensory integration skills requires the incorporation of five domains, along with the establishment of a supportive community environment to facilitate their development.

Similarly, Tamblyn et al. (2023) asserted that implementing appropriate sensory and physical interventions holds promise for enhancing social and emotional development in Early Childhood Education and Care (ECEC).

Additionally, children with sensory processing disorders encounter challenges when participating in school activities and adjusting to classroom behaviour. The general education of children greatly benefits from sensory education. Teach the child how to live by providing them with sensory education, which includes teaching them how to recognise and navigate space, among other things (Budakova, 2018).

Gender and Readiness in Sensory Development

Consider the gender of the respondents and test the hypothesis:

H_{1a}: The mean score of sensory development is the same for both boys and girls.

An independent sample Z test was used to compare the mean scores of variables of two different groups, that is, boys and girls. Hence, a Z test was conducted and the results are shown in Table 2. The result shows that there is no significant difference between boys and girls in sensory development, as the p value in this case is more than 0.05. So, the hypothesis H_{1a} was accepted.

In line with the present study, Ismael and Lawson (2012) stated that there is no significant difference in the sensory profiles of boys and girls in pre-school years. In contrast to the present study results, Osório

Table 2
Mean, Standard Deviation and Z Value for Gender

Variables	Gender	N	Mean	Standard Deviation	Z	p Value
Sensory Development	Girl	91	29.75	4.47	0.739	0.461
	Boy	98	29.21	5.37		

et al. (2021) stated that female children with ASD (Autistic Spectrum Disorders) have shown difficulties in sensory processing.

Age and Readiness in Sensory Development

Consider the age of the respondents and test the hypothesis:

H_{1b}: The mean score of sensory development is the same for different age groups.

A one-sample analysis of variance was used to test the hypothesis about means when there are three or more groups of one independent variable. In this case, age group was considered to be the independent variable, which included four age groups (a) 4–4.5 years (b) 4.5–5 years (c) 5–5.5 years (d) 5.5–6 years. ANOVA was used to compare the mean scores of different age groups; the result is exhibited in Table 3.

The results of the ANOVA test depicted in Table 3 reveal that the statistical value of p is more than 0.05 for all the variables. So, it was concluded that the mean scores of the variable do not differ with age groups. Hence, the hypothesis H_{1b} was accepted.

In contrast to the present study results, Lin et al. (2013) asserted that age plays a substantial role in sensory integration across different stages linked to child development. It has been noted that 5–13 per cent of children between the ages of 4–6 years have these kinds of sensory disorders, and that these impairments have crippling social and emotional effects on them (Ben-Sasson et al., 2009). Accordingly, research on Sensory Processing Disorders (SPDs), which include problems perceiving, regulating, interpreting and/or reacting to sensory inputs, has increased (Miller et al., 2007).

Conclusion

The research emphasises the significant level of sensory development readiness in Anganwadi children aged 4–6 years in Kannur district, Kerala. The results reject the initial hypothesis and indicate that sensory development readiness is over 75 per cent, highlighting the important role played by sensory functioning in kindergarten

Table 3
Mean, Standard Deviation and F Value for Age

Variables	Age	N	Mean	Standard Deviation	F	p Value
Sensory development	4–4.5 years	143	29.13	5.06	1.461	0.227
	4.5–5 years	30	29.93	4.39		
	5–5.5 years	10	32.10	4.51		
	5.5–6 years	6	31.00	4.90		

preparation. Examination of gender differences shows no substantial disparities, which contradicts the findings from some studies on gender-specific challenges related to sensory processing.

Similarly, the variable of age has no significant variance in sensory readiness across different age groups, contrary to some existing literature. These results could give an insight into young children's readiness for learning, contributing to the knowledge of educators and policymakers. Further research could be done into specific sensory domains and interventions in order to tailor educational approaches for optimal sensory development in early childhood.

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