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Effect of Gender in Development of Attention in Malayalam Speaking Children

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Abstract: Cognitive function such as attention is essential for learning, memory, daily functioning and overall quality of life. Understanding the multitude of this cognitive process, including potential gender differences, is crucial for developing tailored interventions and educational strategies. Studies that investigate the gender differences in cognitive-linguistic abilities of young children are sparse in the Indian context. Findings in this direction has revealed potential gender based differences in attention; however the findings are mixed. The current study aims to investigate these claims by exploring the impact of gender on attention development in Malayalam speaking children. 40 children between the age ranges of 4-8 years participated in the study. Equal number of males and females were included. The participants were chosen from regular schools in Thrissur district of Kerala, India. 'Cognitive Linguistic Assessment Protocol for Children in Malayalam', which assesses attention/discrimination, memory, and problem-solving tasks, was used for the study. The findings suggested that, there was a remarkable difference in visual discrimination task between the genders. However, no statistically significant difference was found between the attention tasks. This research supports the notion that attention development is largely influenced was not influenced by gender.

Keywords: Gender, Attention Development, Cognitive-Linguistic, Malayalam

1. Introduction

Cognition has historically been considered the basis upon which language develops. Cognition is the mental act or process of learning and understanding things through thought, experience, and the senses. "Attention, memory, knowledge, decision-making, planning, reasoning, judgment, perception comprehension, language, and visuospatial functions are all examples of high-level intellectual functions and processes" (Dhakal & Bobrin, 2023). The ability to concentrate one's perception and thought on a particular task while ignoring unrelated stimuli is referred to as attention (Erbay, 2013). Attentional processes govern both the selection of both external and internal stimuli for additional processing and, subsequently, the decision of which inputs call for a response. Understanding the nuances of gender differences in cognitive functions like attention is crucial for developing tailored educational strategies and interventions especially in the field of linguistics and language pathology.

Previous research has suggested that males and females may exhibit different strengths and weaknesses in these cognitive domains, potentially due to a combination of biological, psychological, and sociocultural factors (Halpern, 2012).Biological explanations for gender differences in attention often focus on the role of sex hormones, brain structure, and genetics. Cognitive theories propose that males and females may utilize different strategies for processing information, which could lead to observed differences in attention (Miller & Halpern, 2014). Socialization processes and environmental contexts also play a significant role in shaping cognitive abilities. Gender stereotypes and expectations can influence how individuals approach cognitive tasks and the strategies they use.

Investigating cognitive differences between boys and girls can shed light on when, where, and how these differences may develop. Various factors, such as societal discrimination, differing parental investment, inherent talents, temperaments, and vested interests, offer different predictions about the timing and nature of these developmental differences. For instance, Galsworthy *et al.* (2000) explored the genetic and environmental determinants of verbal and non-verbal cognitive abilities in over 3,000 pairs of 2-year-old twins. They found that girls scored higher in both areas ($p < .0001$), though sex only explained around 3% of the variance in verbal ability and 1% in non-verbal ability. The study concluded that genetic and environmental factors influence boys' and girls' early verbal development differently but not their non-verbal development (Galsworthy *et al.,* 2000). Similarly, Ardila *et al.* (2011) observed that sex differences accounted for a similar percentage of performance variance (1–3%) when assessing 788 monolingual children aged 5–16 from Mexico and Colombia. In this study, boys generally outperformed girls in language tasks, spatial abilities, and visual tasks, while girls outperformed boys only in a tactile task involving object identification by touch.

Some of the previous studies have also put forth contradictory results. Few researchers found gender differences as well: girls had quicker reaction times, but their accuracy lagged behind boys (Sobeh & Spijkers, 2012). One study found that "attention issues in boys were linked to less-developed expressive language skills, while issues in girls were associated with lower academic performance" (Zevenbergen & Ryan, 2010). Females have superior verbal abilities compared to males.

Sruthi and Rajasudhakar (2016) studied the development of the cognitive linguistic skills in Kannada speaking children between 6-8 years of age. 50 children (25 each in boys and girls) in the age range of 6-6.11 years & 50 children (25 each in boys and girls) in the age range of 7-7.11 years participated as group I and Group II, respectively in the study. Generally, girls outperformed boys in many of the cognitive-linguistic tasks. However, no significant gender wise difference was observed in any of the cognitive linguistic tasks except auditory memory task. Gender plays a crucial role in attentional performance among various influencing factors (Solberg et al., 2018). In typically developing (TD) individuals, men and women may demonstrate different attentional capabilities due to variations in brain activation patterns. A prominent theory in the literature, the selectivity theory, proposes that different hemispheres of the brain (Tsichla *et al.,* 2014) govern the processes and thresholds for information processing in men and women.

During early childhood, gender differences in attention span and focus begin to emerge. Often boys are found to have shorter attention spans compared to girls, who typically excel in tasks requiring sustained attention (Else-Quest *et al.,* 2006).In school-aged children, gender differences in attentional skills and academic performance become more pronounced. Boys are generally more prone to attention-deficit/hyperactivity disorder (ADHD), while girls may excel in tasks requiring selective attention and verbal memory (Willcutt, 2012). Pradhan and Nagendra (2008) conducted a study with 819 school students ranging in age from 9 to 16 years. The results showed that both sexes performed better on the cancellation task when they were older, with females scoring higher than males. For the Letter cancellation task, age was a better predictor than sex. It should be noted that gender differences in attentional performance are still unclear. The literature on gender differences is limited and primarily focuses on clinical populations.

Numerous studies have shown that attention significantly impacts specific process pertaining to perception, learning, and memory (Gazzaley & Nobre, 2012; Magen, 2017; Scerif & Wu, 2014). Grossberg's (2005) proposed the adaptive resonance theory, this theory suggests that attention facilitates learning by aligning long-term memory with short-term memory (STM), creating feedback resonance between the two. Gender differences in attentional control is reported in both children and adults aged 10-70 years (Riley *et al.,* 2016). This research found that that the male participants performed better than women and the nature of errors was different across males and females Males exhibited commission errors while women made more omission errors. Stoet (2017) found that adult women aged 18 and older had poorer attention compared to men. Additionally, a study of 2,200 children aged 5-7 years revealed that girls generally exhibited better attention than boys.

Alavi *et al.* (2019) explored the relationships between attention, impulse control, gender, and academic achievement among typically developing children. Their study included 270 primary school students (142 boys and 128 girls) from different nationalities living in Malaysia, with a mean age of 9.75 years. They found that girls from Far Eastern cultures demonstrated significantly higher levels of attention and impulse control compared to boys.

Despite these gender differences, the study did not find gender to be a moderating factor in the relationship between these traits and academic achievement. One explanation for this could be that both boys and girls may employ similar levels of attention and impulse control in their academic efforts, with boys possibly exerting effortful control over their naturally higher levels of inattention and impulsivity during learning and academic tasks.

Some systematic reviews/scoping reviews and meta-analysis have examined the effect of age and gender on cognitive linguistic abilities. For example, a study by Pavlinac Dodig *et al.* (2020) examined the development of cognitive abilities during adolescence and the findings reported that that girls outperform boys and this difference was evident for verbal tasks. A study by Rinaldi *et al.* (2023) was a systematic review examining the effect of age and gender in cognitive linguistic development and the findings showed that gender was a potential variable differentiating the cognitive-linguistic abilities.

Preschoolers show gender differences in attention abilities. Girls tend to receive more positive interactions from teachers compared to boys, while boys are more likely to exhibit attention problems that are related to less well-developed expressive language skills and lower performance on academic skills measures. Additionally, boys have been found to have higher distractibility and impulsivity compared to girls, especially those from lower socioeconomic backgrounds. However, girls outperform boys on inhibitory control and short-term memory tasks, while boys do not differ from girls in attention and working memory tasks. These findings suggest notable gender-based differences in attention abilities during the preschool period, with girls generally showing better inhibitory control and sustained attention, while boys may be more susceptible to the effects of the early environment. The current study aims to investigate the impact of gender on attention development in Malayalam speaking children in the age range of 4-8 years.

2. Methods

2.1 Participants

Forty participants were considered for the study. The study enrolled typically developing children between the ages of 4 and 8 years. Four subgroups of participants were formed: 4 years to <5 years, 5 years to <6 years, 6 years to <7 years, 7 years to <8 years. In each subgroup, an equal number of males and females were considered. There were a total of ten participants (5 males and 5 females) in each subgroup. Ethical clearance was sought from the Institutional Review Board (IRB) for Bio-Behavioral research involving Human Subjects (SH/IRB/M1.SLP/R 39)

2.2 Inclusion criterion

For the purpose of selecting participants, the following criteria were used:

1) Participants must be native speakers of Malayalam and studying in English-medium schools in Kerala.
2) Participants should have normal or corrected vision and no significant deficit in hearing sensitivity for speech.
3) During the testing period, participants were ensured to be physically fit.

The participants were students of Normal School and were picked from the recommendation of the teachers. No specific developmental measures or intelligence was administered for screening the participation

3. Procedure

Children were comfortably seated and tested in a room with minimal external noise. 'Cognitive Linguistic Assessment Protocol for Children in Malayalam (Joby *et al.,* 2023) was used for the study. Attention, Discrimination, and Perception were assessed using 6 tasks. The items/tasks were organized in a hierarchy so that the task complexity increased as the presentation of the levels progressed. The test was conducted on both the auditory and visual sensory modalities and the responses were scored.

Table 1. Tasks used in CLAP-C to assess attention

Domain	Tasks given Auditory mode	Score	Tasks given Visual mode	Score
Attention/ Discrimination	Digit count test (DC)	5	Odd one out test (OO)	5
	Sound count test (SC)	5	Letter cancellation (LC)	5
	Auditory word discrimination (AD)	10	Visual-word discrimination (VD)	10
Total score		20		20

4. Results

The mean scores of the children in each age group were compared and tabulated using the SPSS software (Statistical Package for the Social Sciences, Version 26) and then subjected to statistical analysis. Descriptive statistics were used to describe and summarize the current data set's characteristics and is given in Table 2.

Table 2. The mean and standard deviation scores of participants across gender

Domain		Males		Females	
	Age groups	Mean	SD	Mean	SD
Attention	**4-<5 years**	11.80	8.106	15.00	7.842
	5-<6 years	26.60	6.148	27.00	2.236
	6-<7 years	32.00	4.243	34.20	2.049
	7-<8 years	37.00	1.000	36.00	3.937

Therefore, it was evident that the performance of the males and females were not statistically significantly different across the attention domain in different age groups. The performance of individuals from both groups was compared using the Mann-Whitney U test. Mean ranks of participants in different tasks of attention are displayed in graphs below according to different age groups.

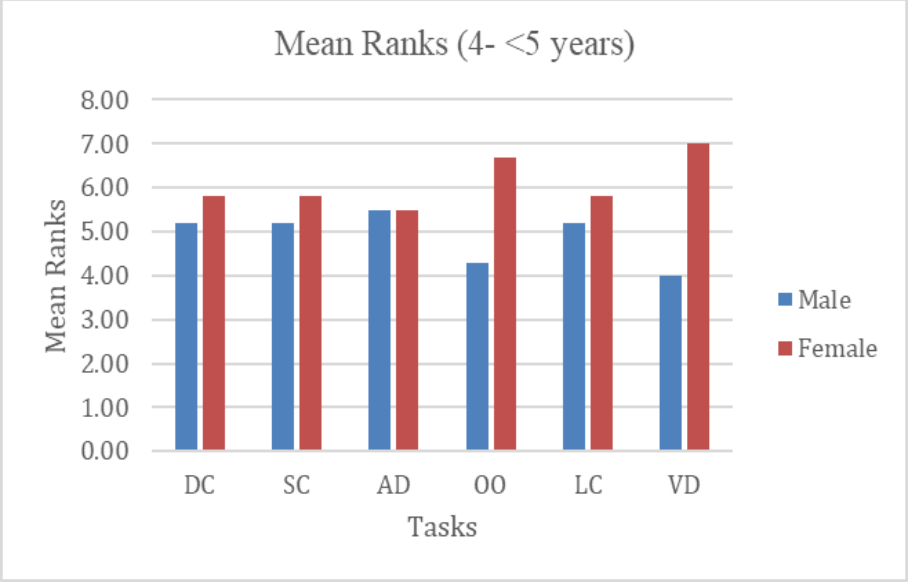

Figure 1. The mean ranks of 4-<5 year-old children across tasks

It was evident from the graph that girls outperformed boys in most of the tasks. There were remarkable difference in Odd one out test and Visual discrimination task.

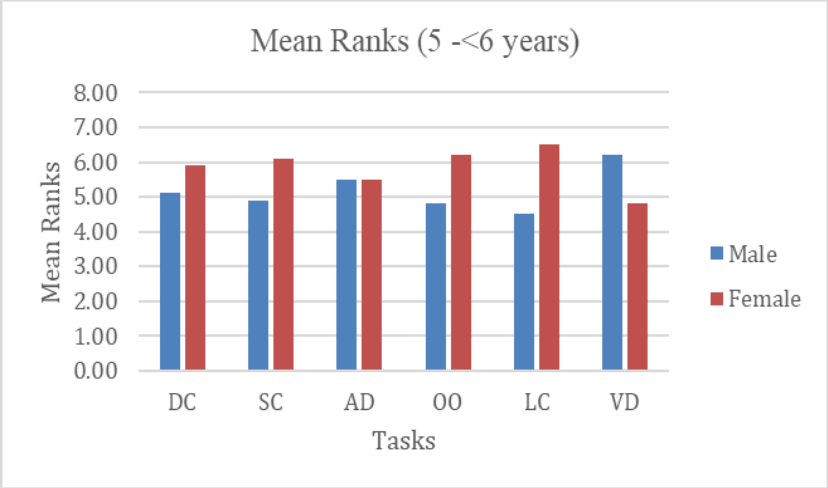

Figure 2. The mean ranks of 5-<6 year-old children across tasks

As shown in the graph, girls of the age group 5-<6 year performed better than boys in all the tasks except visual discrimination task.

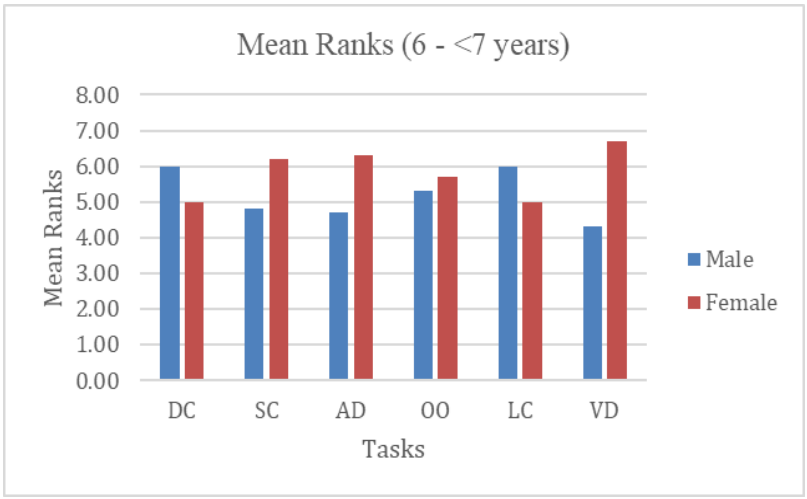

Figure 3. The mean ranks of 6-<7 year-old children across task

The graph depicted that the performances of both gender groups were similar in this age group. Females attained greater scores in visual discrimination task than their male counterparts compared to other tasks.

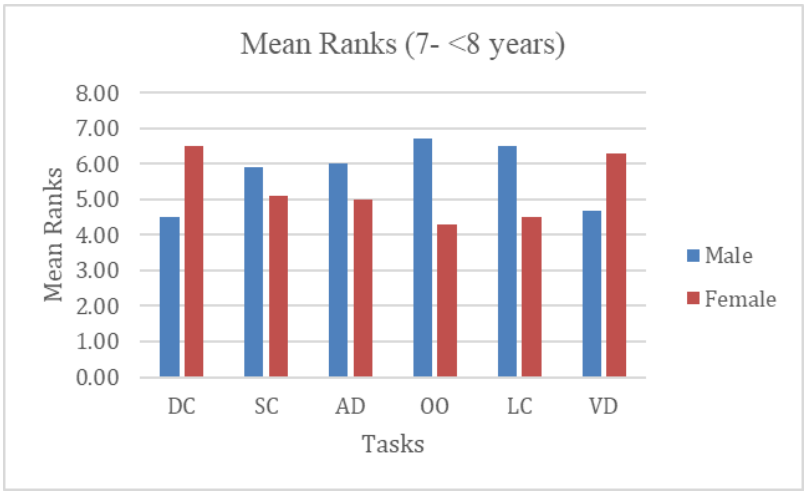

Figure 4. The mean ranks of 7-<8 year-old children across tasks

The graph displayed that the mean ranks of 7-<8 year-old children across the tasks were different from smaller age groups. The boys outperformed girls in majority of the tasks remarkably in Odd one out task.

The test statistics of the Mann Whitney U test are shown in Table 3.

Table 3. Test statistics

Age groups	Tasks	Mann-Whitney U	Wilcoxon W	Z	n
4-<5 years	DC	11.000	26.000	-.386	0.5
	SC	11.000	26.000	-.386	0.56
	AD	12.500	27.500	.000	0.39
	OO	6.500	21.500	-1.306	0.32
	LC	11.000	26.000	-.386	0.41
	VD	5.000	20.000	-1.677	0.39
5-<6 years	DC	10.500	25.500	-.438	0.49
	SC	9.500	24.500	-.657	0.52
	AD	12.500	27.500	.000	0.26
	OO	9.000	24.000	-.808	0.39
	LC	7.500	22.500	-1.225	0.39
	VD	9.000	24.000	-.745	0.39
6-<7 years	DC	10.000	25.000	-.600	0.41
	SC	9.000	24.000	-.767	0.43
	AD	8.500	23.500	-.898	0.42
	OO	11.500	26.500	-.239	0.53
	LC	10.000	25.000	-.600	0.56
	VD	6.500	21.500	-1.386	0.61
7-<8 years	DC	7.500	22.500	-1.500	0.41
	SC	10.500	25.500	-.516	0.39
	AD	10.000	25.000	-1.000	0.47
	OO	6.500	21.500	-1.423	0.41
	LC	7.500	22.500	-1.500	0.42
	VD	8.500	23.500	-.949	0.46

The Mann-Whitney U test results revealed that the performance of children from different gender groups across domains was not statistically significantly different from each other. It was concluded that the U statistic is 6.000 or more for all the tasks. The $|Z| < 1.96$ ($p > 0.05$), which again suggested the above findings. Therefore, it was evident that the performance of the males and females was not statistically significantly different. The n values ranged from 0.26 to 0.53 the effect size was small to medium.

5. Discussion

Both sustained and selective attentions were evaluated using CLAP-C (Malayalam). Digit count tests, sound count tests, and auditory word discrimination were used as tasks for auditory attention. The visual attention tasks used in this study were the odd one out test, letter cancellation (LC), and visual word discrimination, all of which required sustained attention.

In the present study, there was no gender effect observed in the performance of participants in Attention skills. These findings were consistent with a study done by Ardila *et al.* in 2011. They looked at gender differences in a sizable sample of Spanish-speaking children using the Attention, Perception, Language, Metalingusitic Awareness, Memory (Coding), Constructional, and Spatial subtests of the Child Neuropsychological Assessment. Across six age groups, from 5 to 16, the performance of boys and girls was compared in seven cognitive domains. Although there was a statistically significant difference between boys and girls in only three of the domains—sensory-perceptual, oral language, and spatial abilities, age had a significant impact on all of them. Boys outperformed girls in all of these areas. Total scores in the other four domains showed no discernible difference between boys and girls.

The study's findings are consistent with the notion that gender differences in language and other cognitive abilities are typically negligible or insignificant.

Pradhan & Nagendra (2008) conducted a study with 819 school students ranging in age from 9 to 16 years. The results showed that both sexes performed better on the cancellation task when they were older, with females scoring higher than males. For the Letter cancellation task, age was a better predictor than sex. It should be noted that gender differences in attentional performance are still unclear. The literature on gender differences is limited and primarily focuses on clinical populations.

Children from privileged families in Abidjan did not significantly differ in their attention level development based on their gender, according to a study by N'dri. In 2022, N'dri conducted a follow-up study to investigate the potential correlation between gender and attention development in children from low-income families during play (N'dri, 2022). Regardless of the game genre, he discovered that there is no discernible difference in the amount of sustained attention between boys and girls in gaming circumstances. Any disparities identified between female and male subjects regarding the magnitude of attentional focus would likely be attributable to random variances. Nevertheless, these findings suggest distinctions between female and male subjects in the nature of attentional problem-solving abilities. The male subjects are likely to employ more sophisticated strategies than their female counterparts when engaging with attentional tasks. This discrepancy may stem from inherent differences as well as contextual factors (N'dri, 2022).

Convergences are identified in the research conducted by Duval *et al.* (2016), who demonstrate that gender does not exert an influence on the development of executive functioning. The absence of gender disparities in attention is further corroborated by the findings of Carbonneau (2019) and Gershon (2002), who observed no significant differences in sustained attention between boys and girls.

6. Conclusions

In summary, while there are discernible trends regarding gender differences in attention, the individual variability that exists within these categories is often far more pronounced. The interplay of biological, cognitive, and social factors creates a complex landscape where attention is not solely defined by gender. Genetic predispositions and hormonal influences can indeed contribute to differences in how attention is allocated, with some studies suggesting that males may perform better in spatial tasks while females often excel in verbal tasks. However, the current study showed that the cognitive skills did not vary as a function. Other factors like education, family influence, and peer dynamics heavily impact the development of attention skills. Individual experiences can lead to stark differences in attention regardless of gender, making it essential for researchers and educators to consider these variations. Future research should prioritize a holistic understanding of these factors, exploring not only the biological underpinnings but also the sociocultural contexts that shape cognitive development. The study considered a sample of size of only 40 due to the time constraint and the sample size was not determined through sample size calculation formulae or power analysis, this is a potential limitation and the sample size can be calculated for participant enrolment in future studies. The other limitation was that the psychometric properties were not derived in terms of validity, and reliability was not derived. Determination of such parameters would have given a better hold for the administration of the test

References

Alavi, M., Seng, J.H., Mustaffa, M.S., Ninggal, M.T., Amini, M., Latif, A.A. (2019). Attention, Impulsiveness, and Gender in Academic Achievement Among Typically Developing Children. Perceptual and Motor Skills, 126(1), 5–24. https://doi.org/10.1177/0031512518809163

Ardila, A., Rosselli, M., Matute, E., &Inozemtseva, O. (2011). Gender differences in cognitive development. Developmental Psychology, 47(4), 984–990. https://psycnet.apa.org/doi/10.1037/a0023819

Carbonneau L., M., Demers, M., Bigras, M., & Guay, M. C. (2021). Meta-Analysis of Sex Differences in ADHD Symptoms and Associated Cognitive Deficits. Journal of Attention Disorders, 25(12), 1640–1656. https://doi.org/10.1177/1087054720923736

Dhakal, A., Bobrin, B.D. (2023). Cognitive deficits. In StatPearls. StatPearls Publishing.

Duval, S., Bouchard, C., Pagé, P., & Hamel, C. (2016). Quality of classroom interactions in kindergarten and executive functions among five year-old children. Cogent Education, 3(1). https://doi.org/10.1080/2331186X.2016.1207909

Else-Quest, N. M., Hyde, J. S., Goldsmith, H. H., & Van Hulle, C. A. (2006). Gender differences in temperament: A meta-analysis. Psychological Bulletin, 132(1), 33-72.

Erbay, F. (2013). Predictive power of attention and reading readiness variables on auditory reasoning and processing skills of six-year-old children. Educational Sciences: Theory and Practice, 13, 422–429.

Galsworthy, M.J., Dionne, G., Dale, P.S., Plomin, R. (2000). Sex differences in early verbal and non-verbal cognitive development. Developmental Science, 3(2), 206–215. https://doi.org/10.1111/1467-7687.00114

Gazzaley, A., Nobre A.C. (2012) Top-down modulation: Bridging selective attention and working memory. Trends in Cognitive Sciences, 16, 129–135. https://doi.org/10.1016/j.tics.2011.11.014

Gershon J. (2002). A meta-analytic review of gender differences in ADHD. Journal of attention disorders, 5(3), 143–154. https://doi.org/10.1177/108705470200500302

Grossberg, S. (2005) Linking attention to learning, expectation, competition and consciousness. Neurobiology of Attention, 652-662. https://doi.org/10.1016/B978-012375731-9/50111-7

Joby, J., Priyadarshi, B., Abhishek, B.P. (2023) Adaptation of Cognitive Linguistic Profile to Malayalam, Unpublished Master's dissertation, submitted to All India Institute of Speech and Hearing, Mysore

Halpern, D.F. (2012). Sex differences in cognitive abilities. Psychology Press.

Magen, H. (2017) The role of central attention in retrieval from visual short-term memory. Psychonomic Bulletin & Review, 24, 423–430. https://doi.org/10.3758/s13423-016-1111-9

Miller, D.I., & Halpern, D.F. (2014). The new science of cognitive sex differences. Trends in Cognitive Sciences, 18(1), 37-45. https://doi.org/10.1016/j.tics.2013.10.011

N'dri, Y. E. (2022). Gender and attention development in children in play situations in Abidjan/Côte d'Ivoire. International Journal of Social Science and Human Research, 5(12), 5458–5465. https://doi.org/10.47191/ijsshr/v5-i12-32

Pavlinac Dodig, I., Krišto, D., Lušić Kalcina, L., Pecotić, R., Valić, M., Đogaš, Z. (2020). The effect of age and gender on cognitive and psychomotor abilities measured by computerized series tests: a cross-sectional study. Croatian Medical Journal, 61(2), 82–92. https://doi.org/10.3325/cmj.2020.61.82

Pradhan, B., Nagendra, H.R. (2008). Normative data for the letter-cancellation task in school children. International Journal of Yoga, 1(2), 72–75. https://doi.org/10.4103/0973-6131.43544

Riley E., Okabe H., Germine L., Wilmer J., Esterman M., DeGutis J. (2016) Gender differences in sustained attentional control relate to gender inequality across countries. PLoS One, 11, e0165100. https://doi.org/10.1371/journal.pone.0165100

Rinaldi, P., Pasqualetti, P., Volterra, V., Caselli, M. C. (2023). Gender differences in early stages of language development. Some evidence and possible explanations. Journal of Neuroscience Research, 101(5), 643–653. https://doi.org/10.1002/jnr.24914

Scerif G., Wu R. (2014) 31 Developmental Disorders: A Window onto Attention Dynamics. Oxford University Press, England. https://doi.org/10.1093/oxfordhb/9780199675111.013.030

Sobeh, J., Spijkers, W. (2012). Development of attention functions in 5- to 11-year-old Arab children as measured by the German Test Battery of Attention Performance (KITAP): A pilot study from Syria. Child Neuropsychology: A Journal on Normal and Abnormal Development in Childhood and Adolescence, 18(2), 144–167. https://doi.org/10.1080/09297049.2011.594426

Sruthi,S., Rajasudhakar, R (2016) Development of cognitive linguistic skills in Children, Unpublished Master's dissertation, submitted to All India Institute of Speech and Hearing, Mysore

Stoet G. (2017). Sex differences in the Simon task help to interpret sex differences in selective attention. Psychological Research, 81, 571–581. https://doi.org/10.1007/s00426-016-0763-4

Tsichla, E., Hatzithomas, L., Boutsouki C. (2016) Gender differences in the interpretation of web atmospherics: a selectivity hypothesis approach. Journal of Marketing Communications, 22(6):563–586. https://doi.org/10.1080/13527266.2014.903507

Willcutt, E.G. (2012). The prevalence of DSM-IV attention-deficit/hyperactivity disorder: A meta-analytic review. Neurotherapeutics, 9(3), 490-499. https://doi.org/10.1007/s13311-012-0135-8

Zevenbergen, A.A., Ryan, M.M. (2010). Gender differences in the relationship between attention problems and expressive language and emerging academic skills in preschool-aged children. Early Child Development and Care, 180(10), 1337–1348. https://doi.org/10.1080/03004430903059292

Author Contribution Statement

Juniya Joby: Conceptualization, Data collection, Investigation, Formal analysis, Writing original draft. Brajesh Priyadarshi: Conceptualization, Investigation, supervision, Writing, review & Editing. Abhishek BP: Formal analysis, Writing, review & Editing. All the authors read and approved the final version of the manuscript.

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Ethics Approval

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Has this article been screened for Similarity?

Yes

Conflict of interest

The Authors declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.