The International Journal of Indian Psychology
ISSN 2348-5396 (Online) | ISSN: 2349-3429 (Print)
Volume 13, Issue 1, January- March, 2025
DIP: 18.01.078.20251301, DOI: 10.25215/1301.078
https://www.ijip.in

Research Paper

Exploring Developmental Differences in Cognitive and Behavioral Profiles of Children with ADHD: Findings from WISC-IV and Conners-3

Ms. Shweta Lal[1]*, Ms. Priyanka Bhattacharya Bhoopal[2]

ABSTRACT

With an emphasis on developmental differences, this cross-sectional study explores the cognitive and behavioral profiles of preadolescent and adolescent children with ADHD. The Conners 3 Parent Rating Scale and WISC-IV were used to analyze data from 23 children, aged 9 to 16, for behavioral evaluation and cognitive assessment. The results show a significant correlation between cognitive domains and behavioral manifestations ($p < .05$). The findings indicate that while processing speed deficits are prevalent in both study groups, working memory cannot always be a diagnostic marker for ADHD. This research emphasizes the need for age-specific approaches in understanding and management of ADHD-related cognitive functioning and related behavioral manifestation of problems.

Keywords: *Conners-3, WISC-IV, Behavioral Assessment, ADHD, Cognitive Profiles, Developmental Differences*

It is common for children, especially young school children, to be active, energetic, and exuberant and to flit from one activity to another as they explore their environment and its novelties. Children often find tasks lacking intrinsic appeal boring. Emotional reactions to these events are often readily apparent and typical characteristics of young children. On the other hand, clinicians now diagnose excessively active children, who are unable to sustain their attention and are deficient in impulse control to a degree atypical for expected developmental levels, with Attention Deficit/Hyperactivity Disorder. The current epidemiological studies show that we may have to manage the needs of 3-5 children with ADHD per class strength of 50 students.

According to the *Diagnostic and Statistical Manual of Mental Disorders, Fifth Edition* (DSM-5), ADHD is a neurodevelopmental disorder characterized by impairing levels of inattention, disorganization, hyperactivity-impulsivity, or a combination of these. (APA, *2013*). Inattention and disorganization entail inability to stay on task, seeming not to listen, and losing materials, that are inconsistent with age or developmental level. Hyperactivity-impulsivity entails over-activity, fidgeting, inability to stay seated, intruding into other

[1]Lecturer, Sarojini Naidu College for Women, Department of Psychology, Kolkata
[2]Guest Lecturer, West Bengal State University; Clinical Psychologist, Mental Health Foundation, Kolkata
*Corresponding Author

Received: November 27, 2024; Revision Received: February 08, 2025; Accepted: February 12, 2025

people's activities, and inability to wait—symptoms seemingly excessive for age or developmental level.

ADHD is the most common disorder of childhood, observed more frequently in males than females in the general population, with a ratio of approximately 2:1 according to the DSM-V and up to 3:1 as reported by Wittchen et al. (2011). Researches show that clinicians underdiagnose ADHD in girls. (Quinn et al, 2014) Approximately 8-10% of males and 3-4% of females, under the age of 18 have ADHD. Roughly 80% of children with ADHD will continue to meet diagnostic criteria for ADHD into their adolescence years and 60% will maintain core symptoms into adulthood (Wittchen et al, 2011). In primary school studies in India, the prevalence of ADHD is 11.32%. The males (66.7%) had a higher prevalence than the females (33.3%). The prevalence in the lower socio-economic group was 16.33%, and in the middle socio-economic group, it was 6.84%; The 9-10-year-old children had the highest prevalence of ADHD. (Venkata et al, 2013)

The symptom profile of ADHD has been found to change concerning the developmental stage of the child and is sensitive to maturational changes in the brain. For example, it is well known that a very young child with ADHD is likely to run about and climb a lot more than an adolescent with ADHD. ADHD has been found to carry on to adulthood passing through the storm and stress of adolescence. The human brain undergoes a maturational leap during the transition from preadolescence to adolescence and sleep becomes a necessary element in supporting this growth. This finding has sparked schooling practices of allowing extra napping time in some schools (Kurdziel et al,2013), and permitting middle schoolers to start school an hour later to accommodate their sleep needs. (Urrila et al., 2017)

The diagnosis of ADHD has been established in the form of a constellation of symptoms by the DSM V and ICD 10 and Inattention, Hyperactivity, and Impulsivity are briefly its 3 major symptom criteria. Core deficits and associated symptoms of ADHD are executive function deficits, impaired working memory, impaired sustained attention, and behavioral inhibition (Alderson et al, 2010).

As part of a comprehensive clinical formulation and integrative treatment plan, we need to consider cognitive impairments related to ADHD (Brown,2000). Assessing the cognitive profile is a standard practice in the testing profile of ADHD aiming to support diagnostic profiling and generate a baseline for designing treatment which is done in two ways, either through some direct cognitive assessment like Wechsler's Intelligence Scale for Children, Stroop test, Wisconsin card sorting test, Cambridge Neuropsychological Test Automated Battery (CANTAB), Cognitive Assessment Battery for ADHD (CAB-ADHD), Baddley's Working memory Battery and Woodcock-Johnson Tests of cognitive abilities, or through some behavioral assessments for ADHD like Conner's Parent and Teacher Rating Scales, Vineland Adaptive Behavior Scales, Achenbach Child Behavior Checklist, Behavior Assessment System for Children (BASC), Vanderbilt Assessment Scales, and Barkley Home and School Situations Questionnaires. Researchers have reported that the Wechsler Intelligence Scale for Children (WISC) is sensitive in discriminating between children with ADHD and those without. (Bowers, et al. 1992)

A study by Mayes and Calhoun (2006) using WISC-IV shows that children with ADHD scored lowest on the working memory index (Wechsler,1991) and processing speed index. It appears working memory problems play a big role in many of the symptoms of ADHD, including problems with task planning, behavior regulation, and selective attention. In terms of working memory systems, people with ADHD often have difficulty storing and using both verbal and visual information. However, they appear to have greater weaknesses with visual information (Mezacappa & Buckner, 2010). There is an association between processing speed and working memory ability, as those who can process information quickly don't have to hold as much information in working memory, which stores a limited amount of information. People with slow processing speed will rapidly fill up their allotted storage time.

Despite these cognitive challenges, children with ADHD generally have average intelligence; however, their academic and functional performances do not align with their intellectual abilities (Mahone et al., 2010). Assessing patterns of deficits in cognitive functions in ADHD has been a subject of detailed research. It has revealed ACID (Arithmetic, Coding, Information, Digit Span) and SCAD (Symbol search, Coding, Arithmetic, Digit Span) indexes support the diagnostic utility of WISC subtest profile patterns for children with ADHD (Snow et al,2000), however, the developmental aspect of cognitive skill attainment in ADHD population has not been studied in as much detail.

This study aims to compare and explore the developmental differences in the cognitive and behavioral profiles of children with ADHD, focusing on preadolescent and adolescent age groups. It uses the WISC-IV cognitive profiles of these groups and examines the relationship between cognitive performance and behavioral domains of the Conners-3 Parent Rating Scales.

LITERATURE REVIEW

Sadozai et al (2024) conducted a meta-analysis study where they systematically reviewed 180 studies of executive function in several neurodevelopmental conditions, establishing executive function delay as a transdiagnostic feature of neurodevelopmental conditions. Out of all the neurodevelopmental conditions, children with ADHD exhibited larger delays in attention, working memory, planning, and response inhibition.

Shen et al (2024) investigated the neural mechanisms behind working memory (WM) deficits in children with ADHD by comparing them to matched controls. Using neuropsychological tests- modified DMT, and event-related potential (ERP) techniques, the study revealed key deficits. Children with ADHD showed poorer behavioral performance, and slower processing during encoding. High-load verbal tasks revealed diminished neural resource allocation under high cognitive load. These findings highlight significant impairments in the central executive system and processing speed in ADHD, particularly under demanding conditions.

Kofler et al (2020) tested competing model hypotheses related to two possible causal factors in ADHD: processing speed and working memory. Researchers compared children with ADHD and those without ADHD on tasks that tested working memory and information processing speed. Findings showed that as working memory demands increased, there were significant decreases in information processing speed, whereas, decreasing processing information speed in the experimental setting did not have any substantial impact on their ability to retain information in working memory. These results suggest that top-down executive control affects children with ADHD, impacting their information processing speed, while separate issues in this condition involve working memory deficits and slowed processing speed.

Kotnala et al (2018) conducted a study to find out cognitive functioning: working memory, verbal comprehension, perceptual reasoning, and processing speed among children with ADHD and compared with children without ADHD. Results reveal that ADHD children performed significantly different as compared to normal control on Information, General Comprehension, Similarities, Arithmetic, Digit span, Picture completion, Coding, and Mazes subtests of MISIC. Findings showed overall there was a significant difference between ADHD and Non-ADHD children's performance on four major cognitive domains, viz. verbal comprehension, perceptual reasoning, working memory, and processing speed concluding the study that children with ADHD have poor cognitive functioning compared to children without ADHD.

Koh et al (2015) conducted a study investigating Korean Wechsler Intelligence profiles and specific abilities related to attention problems of children with attention-deficit hyperactivity disorder (ADHD). The researchers administered the Korean Wechsler Intelligence Scale for Children- fourth edition (K-WISC-IV) and Advanced Test of Attention (ATA) to 91 children and adolescents. Results revealed that the means of Working Memory Index (WMI) and Processing Speed Index (PSI) score were low average in K-WISC-IV. The study concluded that children with ADHD scored significantly lower in WMI and PSI, which clinicians correlated with ATA scores, and that hyperactive-impulsive/combined subtypes exhibited poorer working memory functions in WMI.

Thaler et al (2012) conducted a study on the WISC-IV profile and its association with differences in symptomatology and outcome in 189 children with attention deficit/hyperactivity disorder. Researchers used the Weschler Intelligence Scale for Children-IV and its profile of ADHD-diagnosed children to examine whether IQ has any association with symptomatology, diagnostic frequency, and its outcome in the ADHD population. The study concluded that children with ADHD scored significantly lower in WMI and PSI, which clinicians correlated with ATA scores, and that hyperactive-impulsive/combined subtypes exhibited poorer working memory functions in WMI.

Weiler et al (2010) conducted a study on Processing Speed in Children with Attention Deficit/Hyperactivity Disorder, Inattentive Type. They explored the neuropsychological profile of this group of 82 children where children with ADHD performed poorly on measures of information processing speed. Some children also met the criteria of Reading disability (RD) and some met the criteria for both ADHD and RD, Children with co-morbid AD/RD were distinguishable from those with RD on speed of processing measures only. This study concluded that vulnerability to information processing load may be at the root of many of the behavioral manifestations of ADHD.

Mayes et al (2006) published a journal on WISC IV and WISC III profiles of ADHD-diagnosed children. Researchers included children with ADHD who had normal intelligence and compared WISC IV and WISV III profiles. They found their indexes were significantly higher in WISC IV - Mean VCI and PRI than WMI and PSI, symbol search than coding. Discrepancies in indexes in WISC IV were greater, so we can say WISC IV will be more helpful in pointing out the strengths and weaknesses of ADHD-diagnosed children. The finding also reveals the lowest score in working memory index (WMI) or processing speed index (PSI) and also in WISC III children scored lowest in freedom from distractibility (FDI) and processing speed index (PSI).

METHODOLOGY

Study Design:

The research adopted a cross-sectional exploratory design to investigate the cognitive and behavioral profiles of children with ADHD. This design enabled a comparative analysis across age groups preadolescents and adolescents to explore developmental differences at a single point in time.

Participants:

The sample consisted of 23 participants (ages 9–16) clinically diagnosed with ADHD, predominantly the combined subtype. We divided the sample into two age groups: preadolescents aged 9–12 years (N=11) and adolescents aged 13–16 years (N=12). Rehabilitation Council of India (RCI)-registered clinical psychologist confirmed the diagnoses of ADHD – Combined type through evaluations, supported by findings from the Conners-3 Parent Rating Scale.

Inclusion Criteria:

- Participants meeting the ADHD – Combined type criteria.
- Participants aged 9 to 16.
- Participants with a Full Scale I.Q ≥ average (score 85; mean=100, SD=15).
- Participants with valid parent rating records of Conners-3.

Exclusion Criteria:

- Participants who have not met the symptom criteria in CONNERS-3.
- Participants aged 8 years 11 months and below, and above 16 years 11 months.
- Participants with a Full-Scale I.Q on WISC below 85 or above 120.
- Participants with anxiety and mood disorders.
- Participants with other impulse control problems.
- Participants with specific learning disorders.
- Participants with inconsistent, biased profiles in parent ratings of Conners-3.

Assessment Tools:

Two assessment tools were used in this study:

1. **Wechsler Intelligence Scale for Children - Fourth Edition (WISC-IV)**: It assesses intelligence across four domains. Verbal Comprehension (VCI) evaluated the participants' ability to reason with language, understand concepts, and express ideas verbally. Perceptual Reasoning (PRI) tested their capacity for spatial reasoning, pattern recognition, and solving non-verbal problems. Working Memory (WMI) measures their ability to retain and manipulate information over short intervals, essential for problem-solving tasks. Processing Speed (PSI) assessed how efficiently they could perform visual-motor tasks with speed and accuracy. Together, these domains provided a comprehensive profile of cognitive functioning.
2. **Conners-3 rating scale**: It is a diagnostic assessment for attention-deficit/hyperactivity disorder (ADHD) which assesses ADHD-related concerns such as inattention and hyperactivity as well as related problems in executive functioning, learning, aggression, and peer/family relations.

Procedure:

At the outset, we obtained informed parental consent, collected sociodemographic data, and administered the WISC-IV and Conners-3. Each test followed the standard procedures outlined in the respective manuals. We selected the participants based on the inclusion and exclusion criteria mentioned earlier. Following data collection, we scored each participant's tests accurately using the respective standard scoring procedures and organized the results into tables before conducting statistical analysis.

Statistical Analysis:

The analysis summarized the group profiles using descriptive statistics. Independent t-tests compared mean differences between the preadolescent and adolescent groups. The analysis examined correlations between cognitive and behavioral measures using Pearson's correlation coefficients and identified age-specific patterns through subgroup analyses.

RESULT AND DISCUSSION

Table No. 1 Comparison of the two study groups across socio-demographic variables

Socio-Demographic Variables	Sig	Mean difference
Educational level	**0.000***	-3.20455
Family Pattern	0.863	-0.03788
Number of working parents	0.837	-0.04545
Domicile	0.907	0.2273
Mother tongue	0.903	0.03030

A t-test for independent samples comparing socio-demographic variables between preadolescent and adolescent groups revealed a significant mean difference in school grades (*p<0.01), as they belong to different grades. The groups were comparable apart from age and grade, the primary variables of the study, which ensured that the study could attribute group differences to the variables under study rather than demographic factors. With this assurance, we conducted further analysis. (Table no. 1)

Table No. 2: Mean Scores of WISC-IV Cognitive Profile of ADHD Subjects (N=23)

Indexes	Mean*	SD
VCI	103	13.70
PRI	97	7.87
WMI	106	11.50
PSI	**88**	**12.91**

**Indexes corrected to the next whole number*

In the present study, the mean score of WMI was average as compared to age norms and is significantly higher when compared to the rest of the WISC IV index scores. The finding is *inconsistent* with the findings of past research where the WMI score of children with ADHD tends to be lower than other indexes (Koh M et al,2015; Thaler et al, 2012; Mayes et al, 2006); *the characteristic low working memory is not homogenous throughout the spectrum of ADHD*. There are children with ADHD who have average WMI but they are unable to execute it behaviorally. It hints towards a possibility of some underlying factor that is barring WMI from manifesting behaviorally. The finding of significant elevation in Conners 3 as associated impairments in ADHD indicates a discordance between cognitive capacity (high WM) and its behavioral manifestation in executive function (see table no. 3). PSI mean score was below average compared to norms highlighting the difficulty ADHD children face in tasks requiring rapid visual information processing and motor output. This aligns with research (Calhoun et al., 2005) linking low processing speed to sluggish cognitive tempo and inefficient academic task completion. Average performance in other indexes suggests that ADHD does not impair all cognitive domains equally, with processing speed being the most marked deficit. (Table No. 2)

Table no. 3: Mean T-Scores of Conners-3 Domains of ADHD Subjects Age 9-16 (N=23)

Subtests	**Participants (N=23) Age 9-16**		**Preadolescent (N=11) Age 9-12**		**Adolescent (N=12) Age 13-16**	
	Mean	**SD**	**Mean**	**SD**	**Mean**	**SD**
Inattention	**86.48**	6.186	**86.18**	7.026	**86.75**	5.610
Hyperactivity	**74.04**	10.359	**75.36**	9.973	**72.83**	10.994
Learning Problem	**78.35**	8.978	**81.00**	8.614	**75.92**	8.959
Executive Functioning	**81.70**	6.928	**80.64**	7.540	**82.67**	6.485
Aggression	68.96	13.092	**70.55**	13.095	67.50	13.494
Peer relations	67.57	11.939	68.18	12.608	67.00	11.824

≥70= very elevated score; 60-69=elevated score; 40-59= average score; ≤39= low score

The behavioral ratings profile in Table 3 corroborates the pervasive impact of ADHD on cognitive and social functioning. Elevated learning problems reflect the aggravating effects of inattention on academic performance. Executive functioning difficulties, linked with poor working memory and impulsivity, highlight the role of cognitive deficits in daily functioning impairments. Studies show that core deficits of ADHD rarely present themselves in isolation but express itself in secondary deficits. Some of these deficits are- the nature of working strategy, learning problems via information processing deficits, and interpersonal adjustment issues due to problems in modulating emotions, which reflects here as a very elevated score in aggression (N=11). Researches show that response inhibition is a cognitive factor that influences the behavioral modulation of emotional states and impulsive ideas. (Krain et al., 2006) (Table no. 3)

(See table no. 4) The positive correlation between VCI and WMI ($r = 0.462$; $p<0.05$), PRI and WMI ($r = 0.506$; $p<0.05$ further supports prior findings indicating an interrelated, especially in tasks requiring problem-solving and the integration of verbal or visual-spatial information. Research suggests that while children with ADHD often show impairments in WMI, relative strengths in VCI and PRI can sometimes compensate in specific contexts, depending on the severity of ADHD symptoms (Mahone et al., 2011). A positive correlation between hyperactivity and inattention ($r=0.429$; $p<0.05$) is consistent with the hallmark symptoms of ADHD, particularly the Combined Presentation subtype (APA, 2013). These domains are often co-occurring and contribute to difficulties in sustained attention and impulse control (Willcutt et al., 2012) reflecting the dimensional nature of ADHD symptoms rather than a categorical distinction between subtypes. The association between learning problems and inattention ($r = 0.443$; $p<0.05$) reflects how attentional difficulties disrupt academic achievement. Children with ADHD often struggle with organizing information, sustaining focus, and retrieving learned material, which can manifest as learning difficulties (DuPaul & Stoner, 2014). Executive functioning ($r = 0.581$; $p<0.01$) deficits are a core feature of ADHD and directly contribute to inattention (Barkley, 1997). Poor planning, working memory, and task-switching ability, often observed in ADHD, exacerbate difficulties in attention regulation and goal-directed behavior. The negative correlation between Perceptual Reasoning (PRI) and Learning Problems (r= -0.632; p<0.01) is an intriguing finding indicating that stronger visual-spatial reasoning skills could buffer against some academic challenges. This finding aligns with studies showing that while ADHD may impair working memory and attention, certain cognitive strengths, like non-verbal reasoning, can mitigate the overall impact on academic performance in specific areas (Mayes & Calhoun, 2007).

Table No. 4: Bivariate Pearson Correlation Analysis of WISC IV and Conners 3 Rating Scale for ADHD subject (N=23)

Variables	1	2	3	4	5	6	7	8	9	10
1. VCI										
2. PRI	0.347									
3. WMI	**0.462***	**0.506***								
4. PSI	0.121	0.375	0.218							
5. Inattention	0.031	-0.053	0.022	-0.073						
6. Hyperactivity	-0.135	-0.014	0.165	-0.023	**0.429***					
7. Learning problem	-0.297	**-0.632****	-0.278	-0.204	**0.443***	0.172				
8. Executive Function	0.326	-0.010	0.105	0.049	**0.581****	0.303	0.333			
9. Aggression	-0.269	0.038	0.344	-0.047	-0.071	0.273	-0.084	-0.154		
10. Peer Relations	-0.290	-0.257	-0.092	-0.194	0.377	0.091	0.157	0.268	0.272	

Table No. 5: T-test Analysis Between Adolescent and Pre-adolescent WISC IV Index Score

INDEX	t- value	p-value	Mean difference	SEM
VCI	3.9473	**0.0007***	-17.500	4.434
PRI	1.1095	0.2798	-3.152	3.290
WMI	2.1893	**0.040***	-9.674	3.290
PSI	0.2452	0.8087	1.348	5.509

*df =21 (*p < 0.05)*

T-test comparison of the WISC IV Index Score- VCI, PRI, WMI, and PSI mean scores of two groups revealed that there is a significant mean difference in VCI mean scores (p=.0007) and WMI mean scores (p=0.040) (see table no. 5). The finding of negative mean differences (VCI= -17.500; WMI=-9.674) indicates that the adolescent group has significantly higher scores in VCI and WM. *This implies that verbal comprehension and working memory abilities have improved with developmental age.* We can also comment that in the current sample, the study sees the effect of the positive developmental changes in the cognitive domain despite the presence of consistent levels of severity of symptoms of ADHD in the children. Studies have shown that verbal comprehension abilities significantly support working memory, particularly in tasks involving language processing and syntactic complexity. Caplan et al (2008) demonstrated that Broca's area, especially the pars opercularis, heavily engages during syntactically complex sentence processing, highlighting verbal working memory's role in maintaining and integrating linguistic information. Alloway et al (2006) further validated this relationship by identifying *verbal working memory as a "mental workspace"* essential for tasks like reading comprehension, where linguistic and cognitive demands intersect. This result emphasizes the interconnection of verbal comprehension and working memory, particularly in managing complex linguistic structures required when transitioning from middle to high school. (see table no. 5)

Table No. 6: Bivariate Pearson Correlation Analysis of WISC IV and Conners 3 Rating Scale for ADHD Preadolescents (N=11)

Variables	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**
1. VCI										
2. PRI	0.047									
3. WMI	-0.124	0.567								
4. PSI	-0.032	0.180	-0.019							
5. Inattention	0.012	-0.096	-0.313	-0.053						
6. Hyperactivity	0.186	0.385	0.045	0.266	0.399					
7. Learning problem	-0.334	-0.574	-0.467	0.153	0.601	-0.010				
8. Executive Function	-0.030	-0.223	**-0.734***	0.165	**0.755****	0.153	**0.612***			
9. Aggression	-0.381	0.498	0.529	0.354	-0.210	0.328	-0.257	-0.331		
10. Peer Relations	0.121	**-0.644***	**-0.710***	-0.170	0.598	0.183	0.543	0.587	-0.252	

*p<0.05; **p<0.01

The findings from correlations *between Executive Functioning, Working Memory (WMI), Inattention, and Learning Problems highlight the intricate relationship of core ADHD deficits.* Researchers strongly tie executive functioning challenges to lower working memory ability (r = -0.734), reflecting the essential role of working memory in supporting self-regulation and goal-directed behavior. These deficits flow into learning problems (r = 0.612), as executive dysfunction impairs critical academic processes like planning, task execution, and information retention. Executive functioning deficits are a core feature of ADHD and directly contribute to inattention (r= 0.755) where difficulties in attentional control and executive processes intertwine in ADHD. (Table no. 6)

Table No. 7: Bivariate Pearson Correlation Analysis of WISC IV and Conners 3 Rating Scale for ADHD Adolescents (N=12)

Variables	1	2	3	4	5	6	7	8	9	10
1. VCI										
2. PRI	0.505									
3. WMI	0.481	0.431								
4. PSI	0.327	0.553	0.375							
5. Inattention	-0.190	-0.066	0.209	-0.091						
6. Hyperactivity	-0.179	-0.289	0.390	-0.174	**0.580***					
7. Learning problem	-0.101	**-0.660***	-0.042	-0.466	0.331	0.272				
8. Executive Function	**0.529***	0.172	**0.628***	-0.006	0.256	0.547	0.107			
9. Aggression	-0.430	-0.370	0.262	-0.226	0.060	0.263	0.083	-0.023		
10. Peer Relations	-0.325	-0.099	0.216	-0.213	0.052	0.050	0.201	-0.143	**0.686***	

*p<0.05; **p<0.01

The positive correlation between Hyperactivity and Inattention (r= 0.580; p<0.05) indicates that higher levels of hyperactivity have a strong association with greater inattention. This finding is consistent with ADHD's diagnostic profile, where these two symptoms often co-occur and exacerbate each other, affecting task focus and behavioral control (Barkley, 2015). The negative correlation between *PRI and Learning Problems* (r= -0.660; p<0.05) suggests that better perceptual reasoning abilities may mitigate learning problems. This aligns with prior research indicating that strengths in non-verbal problem-solving and visual-spatial reasoning can compensate for academic deficits in ADHD (Snow & Sapp, 2000). (table no. 6)

Interesting Findings in terms of Developmental Differences across Study Groups:
An interesting finding is noticeable if we analyze and compare the correlational findings from Preadolescent and Adolescent study groups. (see table no. 6 and 7)

1) In the *adolescent study group*, Executive Functioning showed positive correlations with VCI (r = 0.592) and WMI (r = 0.628). This indicates that adolescents with higher verbal reasoning and working memory abilities also report higher executive functioning problems. However, in the preadolescent study group, stronger working memory in younger children is related to fewer executive dysfunctions, suggesting a negative correlation between Executive Functioning and WMI. The developmental trajectory of cognitive and executive abilities can explain these contrasting findings:

- ***In Preadolescents*:** Cognitive abilities such as working memory are still developing, as they are in the *concrete operational stage* (Piaget, 1964). Younger children with stronger working memory may exhibit fewer executive challenges because these

skills provide foundational support for planning, task execution, and inhibition, which are still maturing (Best & Miller, 2010).
- ***In Adolescents*****:** Adolescents enter the *formal operational stage,* developing abstract reasoning and advanced cognitive strategies. While their cognitive abilities (VCI and WMI) may improve, these strengths might create greater awareness of executive difficulties, amplifying perceived challenges. For instance, they may recognize their inability to organize tasks despite retaining the necessary information, leading to a positive correlation (Kuhn, 2008). Research shows that working memory and verbal comprehension develop significantly during adolescence, but the integration of these abilities into effective executive functioning often lags (Best et al., 2011). Adolescents' heightened self-awareness, coupled with more complex demands, can exacerbate executive dysfunctions despite their cognitive strengths (Crone, 2009).

2) In the *preadolescent study group*, Peer Relations were negatively correlated with Perceptual Reasoning Index (PRI) (r = -0.644) and Working Memory Index (WMI) (r = -0.710), whereas in the *adolescent study group*, Peer Relations were positively correlated with Aggression (r = 0.686).
- ***In Preadolescents*****:** Managing peer interaction in preadolescence is a cognitive function as socialization in children still revolves around board games which use seriation, spatial reasoning, and classification skills which form the basis of Perceptual reasoning and working memory ability. Deficits in these areas may also impair a child's ability to read social cues or engage in reciprocal interactions, leading to peer difficulties (Rose-Krasnor, 1997).
- ***In Adolescents*****:** In adolescence, the nature of play slowly changes to get-togethers and social clubs, informal chats, and 'hanging out'. It is not difficult to imagine how emotional inhibition and response inhibition play a significant moderating role permitting these interactions to go on smoothly. In adolescents with ADHD, a lower ability to inhibit emotions and impulses (Cauffman et al., 2010) may lead to higher levels of aggression, which researchers associate with poor peer relations. During adolescence, peer dynamics shift to include *greater emotional intensity and identity exploration*. Positive correlations between aggression and peer relations also suggest that aggressive behaviors may paradoxically enhance peer status in some adolescent groups, especially where dominance or risk-taking behaviors hold value (Bukowski et al., 1993). Adolescents with ADHD may exhibit impulsivity and aggression, which, while disruptive, can sometimes bolster peer attention or influence. *This shows that cognitive ability in preadolescence influences peer relations, while in adolescence, emotional regulation ability shapes these relationships.*

CONCLUSION

The study reveals that children with ADHD exhibit significant deficits in processing speed, while verbal comprehension and working memory may remain within the average range. Developmental differences were evident, with preadolescents' peer issues linked to working memory challenges, while adolescents showed aggression-related social difficulties and heightened executive awareness. The discord between cognitive capacity and behavioral execution highlights the need for tailored interventions addressing processing speed, executive regulation, and social adaptability across age groups.

REFERENCES

Alderson, R. M., Rapport, M. D., Sarver, D. E., & Kofler, M. J. (2010). ADHD and behavioral inhibition: A meta-analytic review of the stop-signal paradigm. *Journal of Abnormal Child Psychology, 35*(5), 745–758. https://doi.org/10.1007/s10802-007-9131-6

American Psychiatric Association. (2013). *Diagnostic and statistical manual of mental disorders* (5th ed.). Arlington, VA: American Psychiatric Publishing.

Barkley, R. A. (1997). Behavioral inhibition, sustained attention, and executive functions: Constructing a unifying theory of ADHD. *Psychological Bulletin, 121*(1), 65–94.

Barkley, R. A. (2015). *Attention-deficit hyperactivity disorder: A handbook for diagnosis and treatment* (4th ed.). The Guilford Press.

Best, J. R., Miller, P. H., & Jones, L. L. (2011). Executive function and academic achievement in elementary school children. *Developmental Psychology, 47*(3), 605–617. https://doi.org/10.1037/a0022692

Conners, C. K. (2008). *Conners 3 Manual*. Toronto, ON: Multi-Health Systems Inc.

Crone, E. A. (2009). Executive functions in adolescence: Implications for cognitive and brain development. *Developmental Science, 12*(6), 789–798. https://doi.org/10.1111/j.1467-7687.2009.00827.x

DuPaul, G. J., & Stoner, G. (2014). *ADHD in the Schools: Assessment and Intervention Strategies* (3rd ed.). Guilford Press.

Halder, S., & Kotnala, S. (2018). Working memory, verbal comprehension, perceptual reasoning, and processing speed in ADHD and normal children: A comparative study. *Journal of Indian Association for Child and Adolescent Mental Health, 14*. https://doi.org/10.1177/0973134220180107

Kofler, M. J., Soto, E. F., Fosco, W. D., Irwin, L. N., Wells, E. L., & Sarver, D. E. (2020). Working memory and information processing in ADHD: Evidence for directionality of effects. *Neuropsychology, 34*(2), 127–143. https://doi.org/10.1037/neu0000598

Koh, M., Noh, E.-A., & Kim, H.-W. (2015, September 30). Korean Wechsler Intelligence Scale for Children-Fourth Edition Profiles in Child and Adolescent with Attention-Deficit Hyperactivity Disorder: Retrospective Study. *Journal of the Korean Academy of Child and Adolescent Psychiatry*. https://doi.org/10.5765/jkacap.2015.26.3.183

Kuhn, D. (2008). Why development is important for education. In S. S. A. B. L. C. (Ed.), *Handbook of research on learning and instruction* (pp. 6–25). Lawrence Erlbaum Associates.

Kurdziel, L. B. F., Duclos, K., & Spencer, R. M. C. (2013). Sleep spindles in midday naps enhance learning in preschool children. *Proceedings of the National Academy of Sciences, 110*(43), 17267–17272. https://doi.org/10.1073/pnas.1306418110

Mahone, E. M., & Denckla, M. B. (2010). Attention-Deficit/Hyperactivity Disorder: A historical neuropsychological perspective. *Journal of the International Neuro psychological Society*, *16*(2), 231–238. https://doi.org/10.1017/S1355617709991366

Mahone, E. M., et al. (2011). The role of working memory in the diagnosis and subtyping of ADHD. *Journal of Developmental and Behavioral Pediatrics, 32*(6), 512–520.

Mayes, S. D., & Calhoun, S. L. (2006). WISC-IV and WISC-III profiles in children with ADHD. *Journal of Attention Disorders, 9*(3), 486–493. https://doi.org/10.1177/1087054705283650

Mayes, S. D., & Calhoun, S. L. (2007). WISC-IV and WIAT-II profiles in children with high-functioning autism. *Journal of Autism and Developmental Disorders, 37*(4), 712–725.

Quinn, P. O., & Madhoo, M. (2014). A review of attention-deficit/hyperactivity disorder in women and girls: uncovering this hidden diagnosis. *The Primary Care Companion for CNS Disorders, 16*(3), PCC.13r01596. https://doi.org/10.4088/PCC.13r01596

Sadozai, A.K., Sun, C., Demetriou, E.A., et al. (2024). Executive function in children with neurodevelopmental conditions: a systematic review and meta-analysis. *Nature Human Behaviour*. https://doi.org/10.1038/s41562-024-02000-9

Shen, I.-H., Wang, W.-E., Ni, H.-C., & Chen, C.-L. (2024). Investigating Working Memory Deficits in School-Age Children with Attention-Deficit/Hyperactivity Disorder: An Event-Related Potentials Study During Delayed-Match-to-Sample Task. *Journal of Attention Disorders, 28*(14), 1760–1782. https://doi.org/10.1177/10870547241277521

Snow, J. H., & Cote, J. R. (2000). Wechsler Intelligence Scale for Children—III (WISC-III): Profiles for children with attention deficit hyperactivity disorder (ADHD). *Journal of Clinical Psychology, 56*(6), 735–747. https://doi.org/10.1002/1097-4679(200006)56:6<735::AID-JCLP5>3.0.CO;2-7

Snow, R. E., & Sapp, M. (2000). The relationship between perceptual reasoning and learning disabilities. *Learning and Individual Differences, 12*(4), 329–345. https://doi.org/10.1016/S1041-6080(00)00007-9

Thaler, N. S., Bello, D. T., & Etcoff, L. M. (2012). WISC-IV profiles are associated with differences in symptomatology and outcomes in children with ADHD. *Journal of Attention Disorders, 16*(6), 478–486. https://doi.org/10.1177/1087054710397805

Urrila, A. S., Therman, S., Huurre, T., & Marttunen, M. (2017). Sleep-wake rhythm in adolescence: Associations with emotional and behavioral problems. *Journal of Adolescence, 56*, 36–41. https://doi.org/10.1016/j.adolescence.2017.01.003

Venkata, J. A., & Panicker, A. S. (2013). Prevalence of Attention Deficit Hyperactivity Disorder in primary school children. *Indian Journal of Psychiatry, 55*(4), 338–342. https://doi.org/10.4103/0019-5545.120544

Wechsler, D. (2003). *Wechsler Intelligence Scale for Children—Fourth Edition (WISC-IV) Manual*. San Antonio, TX: Pearson Education.

Weiler, M. D., Bernstein, J. H., Bellinger, D. C., & Waber, D. P. (2010). Processing speed in children with attention-deficit/hyperactivity disorder, inattentive type. *Child Neuropsychology, 16*(4), 294–309. https://doi.org/10.1080/09297041003671174

Willcutt, E. G., et al. (2012). Neuropsychological analyses of ADHD: A comprehensive review and meta-analysis. *Neurotherapeutics, 9*(3), 493–504.

Acknowledgment

The author(s) appreciates all those who participated in the study and helped to facilitate the research process.

Conflict of Interest

The author(s) declared no conflict of interest.

How to cite this article: Shweta, L., & Priyanka, B.B. (2025). Exploring Developmental Differences in Cognitive and Behavioral Profiles of Children with ADHD: Findings from WISC-IV and Conners-3. *International Journal of Indian Psychology, 13*(1), 828-840. DIP:18.01.078.20251301, DOI:10.25215/1301.078