

Emotional Awareness, Social Behaviour and Executive Functioning in Children with ADHD

Lakshmi Priya K
Delhi

Susmita Halder
Amity University, Kolkata

Background Attention-Deficit/ Hyperactivity Disorder (ADHD), characterized by a combination of overactive, poorly modulated behaviour with marked inattention and lack of persistent task involvement. A model on ADHD given by Barkley suggested that children with ADHD when faced with situations that are emotionally charged tend to show emotional dysregulation and greater emotional reactivity when compared to children without ADHD. A possible link between the symptoms and impaired executive function in individuals with ADHD and several socioemotional behaviours, including dysregulation, when investigated in earlier studies, shows that symptoms of emotional dysregulation and impaired Executive Function are related to each other. It has also been shown that children with ADHD exhibit low frustration tolerance and explosive behaviour. Research has found that children with ADHD often demonstrate poor emotional self-awareness and higher levels of externalizing behaviour problems relative to unaffected children. Aims: The aim of the study was to find the relation between Emotional Awareness, Social Behaviour and Executive Function in children with ADHD. Settings and Designs: 15 children with ADHD (Inattentive type) were compared with children with ADHD (Hyperactive type), and a possible link between their symptoms, impaired executive function and socio-emotional behaviours, including dysregulation was investigated using neuropsychological tests and emotional awareness and social behaviour scales. Results: Results indicate that there is significant relation between Executive Functioning and Emotional, Social Functioning in children with ADHD. Executive Function has been implicated for long now in the symptoms of ADHD. Conclusion: Current research along with literature support from earlier research has also found the possible implication of deficits in Cognitive Flexibility and Planning and Emotional Dysregulation in children with ADHD. Deficits in the domain of Planning can probably explain the difficulties a child with ADHD has in engaging in appropriate Social Behaviour.

Keywords: ADHD, Executive Functioning, Emotional Awareness, Social Behaviour.

Introduction

Attention-Deficit/ Hyperactivity Disorders (ADHD) are a group of disorders which are characterized by early onset; a combination of overactive, poorly modulated behaviour with marked inattention and lack of persistent involvement in task; and pervasiveness over situations and persistence over time of these behavioural characteristics. It is also characterized by developmentally inappropriate inattention, impulsivity, and hyperactivity which produces impairment at home and school. The worldwide ADHD prevalence rates are around 5.3% in children and adolescents and 2.5% in adults. Studies conducted show that the prevalence of

ADHD in India among primary school children was found to be 11.32%. [1]

Dysregulated emotion is characterized by excessive and rapidly shifting emotions, often associated with irritable and aggressive behaviour [2], and high rates of comorbid oppositional defiant disorder [3][4]. A need to re-assess the characteristics of emotional impulsiveness and deficient emotional self-regulation as core features of ADHD rather than simply associated aspect of the disorder arises, even after its recognition for many years now [5] [6]. Barkley in 1997 gave a model that pointed out that the deficits in inhibition happens when individuals with ADHD are faced with emotionally

charged situations, leading to greater emotional dysregulation or reactivity as compared with those without ADHD. In another study, the amygdala was implicated in the regulation of emotion and the relationship between intrinsic functional connectivity (iFC) of amygdala circuits, and emotion regulation deficits in children aged 6-13 years with ADHD (n=63) and healthy controls (n=19) was evaluated using functional magnetic resonance imaging (fMRI).[7]

It has been recognized for many years now that many children with ADHD exhibit low frustration tolerance and explosive behaviour. Low frustration tolerance and explosive behaviour not only affects the child emotionally, but also affects the child's social, home and school environment. Research looking into executive functioning-which includes the maintenance of future goals, inhibitory control, working memory, and planning, has shown that these children usually have poor executive functioning and this has been linked to the impairment associated with ADHD [8][9][10]. Further, existing literature and various researches done in the field of ADHD also point to the importance of Executive Functioning and its implication in the disorder[11]. Poor executive functioning, which includes the maintenance of future goals, inhibitory control, working memory, and planning, has been linked to the impairment associated with ADHD[8][9]. Research also explicates the deficit in Social understanding and behaviour and how it affects the relationship with family and other members of the society. It also points to the various difficulties in adjustment - in school, at home and other social situations[12]. Along with this, the child goes through many emotional difficulties and these are manifested through the Emotional behaviour.

The question then arises is that, is there, if any, relation between Executive Functioning and Emotional Awareness as well as Social Behaviour. A possibility for a link between these aspects of a child's functioning cannot be completely ruled out. The current research is an attempt to explore this area further, to come to a better understanding of the disorder and how it affects the child and his/her environment and plan for appropriate and relevant treatment programme.

Method

Study Design:

The present study was a cross-sectional and correlational study between children diagnosed with Attention Deficit Hyperactivity Disorder, Inattentive Type and Hyperactive Type and the study spanned over a time period of 6 months. The total size of the sample was 30 with 15 in the Inattentive group and 15 in the Hyperactive group. The age range of the children included in the study was between 8-12 years and children of both the gender were included. The method of neuropsychological assessment and administration of psychosocial scales was used to determine the details about the outcome on the dependent variables.

Tools:

Consent Form: The consent form was prepared to provide the participant about the details of the research and the purpose of the study and finally to obtain the consent of the participant to give data for the research study.

Semi-structured socio-demographic: The socio demographic data sheet was prepared to elicit the necessary information regarding: Name, Age, Sex, Mother Tongue, Educational Status, Medium of Schooling, Domicile, Family Type and Family Income.

Clinical data sheet: The clinical data sheet was used to find out if there are any history of past medical and psychiatric illness, the treatment sought, current medical and psychiatric status and the family history of medical and psychiatric illness. This was used for screening purpose of the participants so that they match to the inclusion criteria of the different groups.

Wechsler Abbreviated Scale of Intelligence, Second Edition (WASI-II) 2011: an updated abbreviated measure of cognitive intelligence was designed for individuals 6 to 90 years of age. The WASI-II was developed to quickly and accurately estimate cognitive intelligence when administration of a full battery is not feasible or necessary [13]. It is nationally standardized, yields the three traditional Verbal, Performance, Full Scale IQ scores, and is linked to the Wechsler Intelligence scale for Children- Fourth Edition

(WISC-IV), and the Wechsler Adult Intelligence Scale- Third Edition (WAIS- III). It consists of four subtests: Vocabulary, Similarities, Block Design, and Matrix Reasoning; which results in VIQ, PIQ, and FSIQ.

Conners 3rd Edition [14]. The Conners 3rd Edition- Parent (Conners 3-P) is an assessment tool used to obtain the parent's observations about the youth's behavior. This instrument is designed to assess Attention Deficit/Hyperactivity Disorder (ADHD), including three groups of Inattentive, Hyperactive and Combined type and its most common co-morbid problems in children and adolescents aged 6 to 18 years old.

Edinburgh Handedness Inventory: The Edinburgh Handedness Inventory was published in 1971 by R.C. Oldfield [15] and has been used in various scientific studies. A questionnaire with ten items was designed to assess handedness by self-report of the preferred hand for carrying out common activities such as writing and drawing, throwing, and using utensils such as, a toothbrush, knife, and spoon. Subjects place one or two check marks on the "left" or "right", indicating strength of preference for each activity, two checks are to be used if the individuals "would never try to use the other hand unless absolutely forced to" for the given function. Some activities require the use of both hands; in that case the direction specify which component reflects hand reference (E.g., in striking a match, the hand that holds the match). A laterality quotient [$LQ = R - L / R + L \times 100$] can be calculated where a score of 100 reflects complete dexterity, and a score of -100 is obtained by complete sinistrals.

Digit Vigilance Test [16]: The test examines the ability to sustain attention. The test involves the sequential presentation of stimuli (1 to 9 randomly ordered numbers) over a period of time. In the test there are 30 numbers in each row and 50 rows on the sheet. The subject has to focus on the target digits i.e. 6 and 9 amongst other distractor digits. The inability to sustain and focus attention leads to increased time to complete the test as well as errors. There are two errors- sum of total number of omissions i.e. the numbers of 6 and 9 which have not been cancelled and the number of commissions i.e.

the number of digits other than the target digits which have been cancelled. The test takes about 15 minutes.

Trail Making Test [17]: The test originally a part of Army Individual Test Battery (1944) is a test for assessing focussed attention, mental flexibility and visuo-motor tracking. It is given in two parts, A and B. The subject must draw lines to connect consecutively numbered circles on one work sheet (Part A) and then on another worksheet, the subject must connect the same number of consecutively numbered and lettered circles by alternating between the two sequences (Part B). The subject is urged to connect circles "as fast as you can" without lifting the pencil from the paper. The reported reliability coefficients vary considerably, with most above .60 but several in the .90s and more in the .80s.

Digit Symbol Substitution Test (DSST) [16]: The DSST is a paper-and-pencil cognitive test presented on a single sheet that requires the patient to copy, into spaces below rows of numbers, the symbols that are matched to each number according to a key located on the top of the page. Good test performance on the DSST requires intact functioning on the attributes of motor speed, attention, visuo-perceptual functions (including scanning), and functions associated with writing or drawing (ie, basic manual dexterity). Performance on the DSST may also be affected by associative learning: If pairings are rapidly learned following the first few trials, performance speed will improve because the patient will not need to check the accuracy of each pairing. The decision to consciously engage in this learning strategy to improve performance speed calls upon the executive functions of planning and strategizing. Working memory - another executive function - is also likely required to keep task rules in mind during the test and for the continual updating of required digit-symbol pairs.

Stroop Colour and Word Test (SCWT): The Stroop Color and Word Test (SCWT) is a neuropsychological test extensively used for both experimental and clinical purposes. It assesses the ability to inhibit cognitive interference, which occurs when the processing of a stimulus feature affects the simultaneous

processing of another attribute of the same stimulus [18]. In the most common version of the SCWT, which was originally proposed by Stroop in the 1935, subjects are required to read three different tables as fast as possible. Two of them are the “congruous condition” in which participants are required to read names of colors (henceforth referred to as color-words) printed in black ink (W) and name different color patches (C). Whereas, in the third table, named color-word (CW) condition, color-words are printed in an inconsistent color ink (for instance the word “red” is printed in green ink). Hence, in the incongruent condition, participants are required to name the color of the ink instead of reading the word. Therefore, the participants are required to inhibit the interference arising from a more automated task and perform a less automated task (i.e., naming ink color). This difficulty in inhibiting the more automated process is called the Stroop effect.

Tower of London Test (TOL)[19]: The Tower of London test is a well-known test used in applied clinical neuropsychology for the assessment of executive functioning specifically to detect deficits in planning, which may be occurring due to a variety of medical and neuropsychiatric conditions. It has its relation to the classic problem-solving puzzle known as the Tower of Hanoi. The test is made of two different boards with pegs and several beads with different colors. The examiner (usually a clinical psychologist or a neuropsychologist) uses the beads and the boards to present the examinee with problem-solving tasks. Several variants of the test exist. Shallice’s original test used three beads and pegs with different heights, although later researchers have generalized this to more beads without a peg height restriction.

Emotional Awareness Questionnaire (EAQ) [20]: The Emotion Awareness Questionnaire (EAQ) was developed with the aim of identifying how children and adolescents feel or think about their feelings. The current version of the EAQ is designed with a six-factor structure describing six aspects of emotional functioning: Differentiating emotions, Verbal sharing of emotions, Bodily awareness of emotions, Acting out emotions, Analyses of emotions, Attention to

others’ emotions. The EAQ consists of a total of 30 items.

Emotional Regulation Questionnaire (ERQ) [21]: The Emotion Regulation Questionnaire is designed to assess individual differences in the habitual use of two emotion regulation strategies: cognitive reappraisal and expressive suppression. Emotions have been viewed as coming and going more or less on their own accord for a while now (Solomon, 1976). In recent times, there is a growing appreciation that individuals exert considerable control over their emotions, using a wide range of strategies to influence which emotions they have and when they have them (Gross, 1998). The Emotions Regulation Questionnaire (ERQ) items were rationally derived; and indicated clearly in each item is the emotion regulatory process intended for measurement, such as “I control my emotions by changing the way I think about the situation I’m in” (reappraisal) and “I control my emotions by not expressing them” (suppression). In addition to these general-emotion items, a Reappraisal scale and a Suppression scale were used. Both included at least one item asking about regulating negative emotion (illustrated for the participants by giving sadness and anger as examples) and one item about regulating positive emotion (exemplified by joy and amusement). Care was taken to limit the item content to the intended emotion regulatory strategy, and to avoid any potential confounding by mentioning any positive or negative consequences for affect, social functioning, or well-being. The final 10 items are rated on a scale from 1 (strongly disagree) to 7 (strongly agree).

Strengths and Difficulties Questionnaire (SDQ) [22]: The Strengths and Difficulties Questionnaire (SDQ) is a brief emotional and behavioral screening questionnaire for children and young people. The tool can capture the perspective of children and young people, their parents and teachers. There are 25 items in the SDQ which comprises of 5 scales of 5 items each. These scales include: Emotional symptoms subscale, Conduct problems subscale, Hyperactivity/inattention subscale, Peer relationships problem subscale and Prosocial behavior subscale. The SDQ can

be used for various purposes like- for clinical assessment, evaluation of outcomes, research and screening, to name a few.

Procedure

Patients visiting the Psychiatry and Clinical Psychology out – patient department, with a diagnosis of ADHD[23] were contacted, and their parents were briefed about the purpose of the study and consent was taken from the parent as well as the child. In order to rule out IQ deficits, the Wechsler Abbreviated Scale of Intelligence (WASI-II) was administered. To check for Inattention or Hyperactive, Conners-3 Parent rating was administered. The socio-demographic details including name, age, sex, address, religion, educational affiliation, residence and family type was then collected and the semi-structural clinical data sheet. After the initial briefing and information gathering was completed, the handedness of the patient was noted using the Edinburgh Handedness Inventory. Thereafter data was collected at on the following tests namely, Trail Making Test, Digit Vigilance Test, Digit Symbol Substitution

Test, Stroop Colour and Word Test, Tower of London Test, and Strengths and Difficulties Questionnaire.

RESULTS

Table1A: Table Showing The Socio-Demographic Details For Inattentive And Hyperactive Group

Variables	Inattentive Group	Hyperactive Group	t-value	p-value
	Mean+S.D	Mean+S.D.		
Age	10.67±1.54	10.13±1.36	1.01	.32
	1.87±.35	1.73±.46	6.57	.52
Year of Education	5.67±2.02	4.97±1.30	1.29	.21

Statistical analyses indicate that there is no significant difference amongst the age, and education variables of the two groups.

The variable of Mother Tongue and Medium of education was found to be same for all the groups. Statistical analysis indicates there is no significant difference among the socio-economic status, type of residence and family type of the two groups.

Table 1B: Table Showing The Other Socio-Demographic Details Of The Two Groups

Variables	Sub-Categories	Frequency + Percentage		Chi-value		p-value	
		Inattentive	Hyperactive				
Socio-economic status	Middle	11 (73.3%)	11 (73.3%)	3.27	3.27	.071	.071
	Low	4 (26.7%)	4 (26.7%)				
Type of Residence	Urban	6 (40%)	10 (66.7%)	.819	7.60	.400	.022
	Suburban	5 (33.3%)	3 (20%)				
	Rural	4 (26.7%)	2 (13.3%)				
Family Type	Nuclear	10 (66.7%)	8 (53.3%)	1.67	2.80	.197	.247
	Joint	5 (33.3%)	3 (20%)				
	Extended	-	4 (26.7%)				

Table 2: Table Showing the Correlation between the Neuropsychological Tests and the Variables of the Emotional Awareness Questionnaire for the Two Groups

VARIABLES		EAQ-Differentiating Emotions	EAQ-Verbal Sharing	EAQ-Bodily Awareness	EAQ-Acting Out	EAQ-Attending to Others' Emotions	EAQ-Analyses of Emotions
DV-Time Taken	Pearson r	.138	-.102	-.306	-.304	-.107	-.079
	Sig(2-tailed)	.466	.592	.100	.102	.572	.679
DV-Omissions		-.12	-.41	-.44	-.43	-.24	-.09
		.52	.01	.02	.02	.21	.64

TMT-A-Time Taken		-.08 .68	-.07 .73	-.17 .36	-.12 .52	-.25 .18	-.25 .18
TMT-B-Time Taken		.01 .95	.14 .47	.04 .85	.15 .44	-.21 .27	-.45 .01
TMT-A-Errors		-.02 .90	-.23 .23	-.22 .24	-.24 .19	-.14 .47	.06 .76
TMT-B-Errors		-.24 .21	-.15 .44	-.16 .39	-.15 .42	-.25 .18	-.13 .49
DSS-Time Taken		-.07 .73	-.09 .64	-.12 .53	-.25 .18	-.24 .21	.05 .81
Stroop-Word		.30 .11	.08 .69	.14 .43	-.05 .81	.09 .64	.30 .10
Stroop-Colour		-.05 .78	.08 .68	.10 .59	-.10 .59	.14 .47	.17 .38
Stroop-Colour-Word		.04 .84	.02 .93	.23 .22	.05 .78	.05 .81	-.06 .77
TOL-Trial 2-Max Moves		.10 .59	.29 .11	-.12 .54	.18 .34	.27 .14	.01 .96
TOL-Trial 2-Average Moves		.10 .59	.32 .09	-.10 .60	.22 .24	.28 .14	-.03 .86
TOL-Trial 2-Average Time		.91 .31	.06 .77	-.24 .20	-.04 .82	.16 .41	-.03 .86
TOL-Trial 3-Max Moves		-.19 .32	.08 .68	-.27 .15	-.25 .19	.06 .75	-.03 .87
TOL-Trial 3-Average Moves		-.22 .25	-.07 .73	-.38 .04	-.29 .12	.07 .72	-.08 .69
TOL-Trial 3-Average Time		-.15 .44	-.19 .33	-.25 .18	-.20 .30	-.31 .10	-.47 .01
TOL-Trial 4-Max Moves		-.26 .16	-.09 .66	-.08 .67	.22 .25	-.22 .25	-.09 .63
TOL-Trial 4-Average Moves		-.41 .02	-.10 .60	-.21 .28	.06 .74	-.10 .60	.04 .83
TOL-Trial 4-Average Time		-.06 .77	-.27 .15	-.13 .49	-.14 .46	-.13 .49	-.23 .23
TOL-Trial 5-Min Moves		-.41 .02	-.10 .60	-.21 .28	.06 .74	-.10 .60	.04 .83
TOL-Trial 5-Max Moves		-.06 .77	-.27 .15	-.13 .49	-.14 .46	-.13 .49	-.23 .23
TOL-Trial 5-Average Moves		-.07 .72	-.19 .31	-.17 .37	-.04 .84	-.40 .03	.00 .98
TOL-Trial 5-Average Time		-.05 .80	-.07 .71	-.41 .03	-.23 .22	.24 .20	.37 .20

Table 2B: Table Showing the Correlation between the Neuropsychological Tests and the Variables of the Emotional Regulation Questionnaire for the Two Groups

Variables		ERQ-Cognitive Reappraisal	ERQ-Expressive Suppression
DV-Time Taken	Pearson r Sig (2-tailed)	.08 .68	.04 .84
DV-Omissions		-.12 .54	-.56 .41
TMT-A-Time Taken		-.09 .65	-.18 .35
TMT-B-Time Taken		.12 .54	.08 .69
DSS-Time Taken		-.11 .58	.25 .18
Stroop-Word		-.28 .14	.01 .97
Stroop-Colour		-.03 .86	.12 .52
Stroop-Colour-Word		.05 .80	-.04 .84
TOL-Trial 2-Max Moves		-.02 .92	.12 .53
TOL-Trial 2-Average Moves		-.09 .66	.10 .60
TOL-Trial 2-Average Time		.21 .26	.04 .85
TOL-Trial 3-Max Moves		.04 .82	.21 .27
TOL-Trial 3-Average Moves		-.03 .89	.07 .73
TOL-Trial 3-Average Time		-.06 .77	-.19 .32
TOL-Trial 4-Max Moves		-.00 .10	-.01 .95
TOL-Trial 4-Average Moves		-.01 .96	.06 .74
TOL-Trial 4-Average Time		-.12 .52	-.05 .80
TOL-Trial 5-Min Moves		-.01 .96	-.06 .74
TOL-Trial 5-Max Moves		-.12 .52	-.05 .80
TOL-Trial 5-Average Moves		.15 .44	.03 .90
TOL-Trial 5-Average Time		.02 .88	-.08 .70

No significant statistical correlation was found between the variables

Table 3A: Table Showing the Correlation between the Neuropsychological Tests and the Variables of the Strength and Difficulties Questionnaire for the Two Groups

VARIABLES		SDQ-Total difficulties score
DV-Time Taken	Pearson Sig (2-tailed)	.01 .95
TMT-A-Time Taken		-.10 .61
TMT-B-Time Taken		-.33 .08
TMT-A-Errors		-.16 .41
TMT-B-Errors		-.08 .68
DSS-Time Taken		-.25 .19
Stroop-Word		-.17 .36
Stroop-Colour		.05 .78
Stroop-Colour-Word		.12 .26
TOL-Trial 2-Max Moves		-.14 .46
TOL-Trial 2-Average Moves		-.21 .28
TOL-Trial 3-Max Moves		.33 .08
TOL-Trial 3-Average Moves		.47 .01
TOL-Trial 4-Max Moves		.17 .38
TOL-Trial 4-Average Moves		.30 .11
TOL-Trial 5-Min Moves		.30 .11
TOL-Trial 5-Max Moves		.26 .71
TOL-Trial 5-Average Moves		.15 -.43

Discussion

Executive Function and Emotional Dysregulation: Research in the past has indicated a definite deficit in emotional awareness and emotional dysregulation in children with ADHD. A recent review concluded that emotional

dysregulation is highly prevalent in ADHD and is a major contributor to impairment, is associated with deficits in the recognition and/or allocation of attention to emotional stimuli, implicating deficits in the striato-amygdalo-medial prefrontal cortical network, and may be ameliorated by

ADHD treatment [24]. A poor emotional self-awareness has been significantly linked to the externalizing behaviour problems in children with ADHD. It has also been stated that dysregulated emotional reactivity plays an important role in this relationship [25].

These dysregulations mostly translate as problems related to behavioural inhibition and emotional inhibition. As a consequence, these children often suffer from the after effects of their dysregulated behaviours. Not often reported by the parents or the school, these children also undergo emotional turmoil due to the inability to moderate emotions; leading to a co-morbid condition that is emotional in nature in these children.

The current study found that there is a correlation between the deficits in the 'cognitive flexibility' domain and 'planning' domain and the components of emotional awareness leading to subsequent emotional dysregulation. From a neuropsychological view-point, impairment of the executive functioning like self-regulation, working memory, planning and cognitive flexibility are associated with the dorsolateral prefrontal cortex, also known as the cool brain [26]. It can thus be hypothesized that deficit in Cognitive Flexibility leads to poor self-control and the ability to adapt to situational demands. Along with a deficit in Planning makes it probably difficult for them to monitor their behaviour in a 'moment of poor self-control' and make corrections in behaviour according to the situational demands. These act as situational stressors for the ADHD child, making them further vulnerable to the display of poor emotional behaviour often in the form of externalizing behaviour.

As earlier studies have implicated Planning and Cognitive Flexibility deficits in ADHD and with the current study showing a probable link between the two; an intervention that focuses at improving the 'planning' and 'cognitive flexibility' of these children may be suggested; which may in turn help the children improve their emotional awareness and engage in less emotionally dysregulated behaviour. Research involving two different types of therapy: one which was planning focused therapy and the other was a solution focused therapy; it was found that the

planning focused therapy was more promising to fill the gap in available treatment for adolescents with ADHD. Another study suggest that, a 10 day intensive mindfulness meditation retreat for adolescents with ADHD found that there was significant improvements in self-reported mindfulness, affect, attentional control and cognitive style. Thus, along with behaviour management techniques, cognitive training to help improve their planning and cognitive flexibility can also aid the children in addressing their problem areas.

Executive Function and Social Behaviour: Researches in the past have shown that there is a definite social behaviour deficit in children with ADHD. It has been observed that cases that present themselves in the clinical setups usually come with complaints of social behaviour disruptions. Parents, teachers and peers are often unable to respond appropriately to these disruptions. A general lack of awareness about how to deal with the child effectively along with problem behaviour being exhibited by the child, the child gets branded as having severe social behaviour deficits.

The current study aimed to find if there is any correlation between the deficits in planning and the social behaviour deficits and subsequent difficulties. The results of the present study found that a correlation between Executive Function deficits and the deficits in Social Behaviour does exist. Further analysis of the results found that the domain of Planning was a difficult area in these children. Planning has earlier been implicated in the Executive Function deficits in children with ADHD[27]. Planning is the identification and organization of the steps and elements needed to carry out an intention or achieve a goal (Lezak, 1995). Planning is the ability to set goals, to monitor performance so as to reach the goals, and to make corrections in the course adopted, in order to ensure that the goal is attained. Goal setting involves not only identifying the final goal, but also identifying the intermediate goals which have to be attained in order to achieve the final goal. The intermediate goals may be in conformity with the final goal or may be contradictory to the final goal. The essence of planning consists of attaining a goal

through a series of intermediate steps. The supervisory attentional system is involved in planning.

It can be suggested that children with ADHD often have difficulty in planning their social behaviour. Though, not all children with ADHD show planning deficits; but those who show the same have often showed school- and social functioning deficits. Due to lack of planning, these children often engage in behaviour that is not socially desirable, despite having the knowledge of what is considered as appropriate behaviour and what is considered as inappropriate behaviour. In instances where the child is expected to control his/her impulsive behaviour and plan out how he/she behaves, a child with ADHD usually is unable achieve the control over his/her impulses and may, additionally have difficulty in planning out their behaviour according to norms and previous learning. Therefore, a probable link between the two can be suggestive of intervention that focuses at improving the 'planning' aspect in these children; which may in turn help the children execute socially appropriate behaviour.

Hence, along with behaviour management techniques, cognitive training to help improve their planning ability can also aid the children in addressing their problem areas[28]. Behaviour management techniques just address the problem behaviour of the child and mostly educate parents on how to deal with these behaviours so that the faulty behaviours can be unlearned and adaptive behaviours can be learnt. In addition, Cognitive training will focus on the deficit area which actually may be posing as a difficulty in the path to learning of adaptive responses by the child. A recent study checked for the effectiveness of two new individual, short-term cognitive behavioural therapies (CBT) - one with the aim of improving planning skills and one with solution-focused treatment (SFT). Planning focused treatment was evaluated more positively and had marginal additional beneficial effects to SFT; filling the gap in available treatments for adolescents with ADHD. Hence, a combination

of the two methods will prove to be more beneficial for the child [29].

Conclusion

The ability to focus attention and regulate behaviour is a key determinant to scholastic achievement and appropriate social behaviour. Most of the children affected with ADHD who come to the clinics often come with difficulties that have a behavioural component and are with regard to their academic progress. These children also exhibit deficits in inhibition when faced with emotionally charged situations, which in turn leads to greater emotional reactivity, as compared to those children without ADHD; making them have to face difficulties which are interpersonal in nature in all spheres of life.

The current study has been able to establish a relation between the neuropsychological deficits and emotional, social behaviour in children with ADHD. Children were found to have a difficulty in adequately planning their behaviour according to the norms. The inadequacy in planning along with difficulty in cognitive flexibility makes its further difficult for the child to adapt to his/her situational demands. Combined with their impulsivity and deficits in attention, these often manifested as socially inappropriate behaviour and emotionally dysregulated behaviour on their part.

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Lakshmi Priya K, Clinical Psychologist, Delhi

Susmita Halder, Ph.D, Associate Professor, Dept of Clinical Psychology, Amity Institute of Behavioural Health & Allied Sciences, Amity University, Kolkata. email- shalder@kol.amity.edu. (Corresponding Author)