Pragmatic Language Deficits in Asperger's Syndrome (Higher Functioning Autism): Review of Pathology and Effective Treatments in Adults

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Abstract: Autism is a neuro developmental disorder. Social communication deficiency is one of the core features of the syndrome. Individuals with autism spectrum disorder vary in their ability considerably. Despite being of normal or above normal intelligence those with higher functioning autism may present with varying degree of deficits in social communication.

Few studies have considered structural abnormalities with respect to brain functioning. This article examines evidence in literature for pragmatic language deficits, origins, assessments and treatments among adolescents and adults with higher functioning autism or Asperger's syndrome.

Keywords: High functioning autism, Asperger's syndrome, autism spectrum disorder, speech and language pathology, intervention, social skills, adults.

INTRODUCTION

Autism is a neuro developmental disorder. The diagnosis is made by a set of behavioural manifestations. Impairment in social use of language, communication or pragmatics is one of the core features of autism and Asperger's syndrome [1-3]. Individuals on the autism spectrum vary in their ability considerably between some with average or above average intelligence and some with significant intellectual disabilities.

The criteria for diagnosis and understanding of autism spectrum disorders have been evolving in recent decades. Childhood autism and Asperger's syndrome were considered as separate entities in the fourth edition of the diagnostic and statistical manual of mental disorders (DSM IV; American Psychiatric Association 1994). Despite the prominence of pragmatic language impairment this was not included in the diagnostic criteria for Asperger's syndrome in DSM IV [4]. There were only two characteristics that pertain directly to communication in DSM IV [4]. These were gross language milestones being achieved within the first three years of a child's life and abnormal non-verbal communication. The fifth edition (DSM V; American Psychiatric Association, 2013) considers autism spectrum disorders as one entity and differentiates subtypes based on individual's level of functioning and associated intellectual disabilities [5]. ICD10 considers them as separate entities. For the purpose of considering pragmatic speech deficits and interventions, higher functioning autism and Asperger's syndrome are not seen as different entities in this article [6].

The speech and language deficits are more obvious among those with lower functioning autism. They are more qualitative among those with higher functioning autism or Asperger's syndrome. Despite being of normal or above normal intelligence and having good vocabulary, those with higher functioning autism may present with deficits and social use of language. While the vocabulary is often well developed, there may be varying levels of deficits in the pragmatics and social use of language among those on the higher functioning autism spectrum.

Few studies have considered pragmatic speech deficits with any associated structural abnormalities in respect of brain functioning. Fewer studies have examined effective treatments of pragmatic language impairment among those with higher functioning autism or Asperger's syndrome particularly in adults. This article examines evidence in literature for pragmatic language impairment, neurological basis, assessments and examines evidence of treatments in adults. Due to paucity of evidence of effective treatments in adults, studies involving adolescents are also considered. Pragmatic deficits among those children aged under 12 with lower functioning autism are not the focus of this article.

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PRAGMATICS OF LANGUAGE AND IMPAIRMENTS

The American Speech-Language-Hearing Association considers pragmatics to involve three major communication skills, which are using language for different purposes, changing language according to the needs of a listener or situation and following rules for conversations and storytelling [7].

Landa described an organisational framework for understanding pragmatic language deficits in three domains; the acts of expressing communicative intentions, presupposition and discourse organisation [8]. This may be a very good structure to understand the basis of pragmatic speech. As described by Landa, the majority of children with higher functioning autism or Asperger's syndrome, exhibit impairment in the development of communicative intentions. Presupposition refers to the knowledge, expectations and beliefs that a speaker postulates to be shared with the conversational partner. Impaired pre-suppositional skills may result from impaired comprehension of nonverbal and verbal cues.

Social discourse is the interchange of ideas in a social context, in conversation. It includes topic initiation, maintenance and termination and conversational repair when there is a breakdown of communication. These three areas of deficits are common among those on the autism spectrum.

There are a large number of studies that examine the speech and language impairments in young children. Evidence suggests that improvements in language functioning are seen among individuals with higher functioning autism during their school years. There are however fewer studies examining the nature of speech and language impairments in adolescents and adults.

Minshew *et al.* compared psychometric analysis of language performance of 62 individuals (older children and adults with mean age of 17.79) with 50 controls [9]. They found in their study that participants with higher functioning autism did as well as controls on basic procedural language tests, but their skills were significantly impaired in complex or interpretive language abilities compared to controls.

Eales studied audio taped conversational samples from adults (aged 21 to 28) diagnosed as having autistic disorders (N=15) or developmental receptive language disorders (N=17) in childhood [10]. Samples were transcribed and analysed. Subjects with autism showed substantially greater pragmatic impairment not explicable by generalised impairment of verbal skills. Autistic subjects showed greater difficulty in forming context-relevant communicative intentions. Pragmatic impairments arising from impairments in execution did not distinguish between the groups. In both diagnostic groups, impairment informing appropriate communicative intentions was closely related to more generalised impairment of reciprocal social behaviour.

Mawhood *et al.* compared adult outcome in a group of young men with autism and a group with developmental receptive language disorders [11]. The two groups were assessed in early childhood when aged 7 to 8 years of age. Although matched at the time for non-verbal IQ (Mean 92-93) and expressive language ability, the autism group was significantly more impaired on most measures of social and communication skills and stereotyped behaviours. A later follow up, in mid-childhood, suggested that although the groups were still quite distinct, social and behavioural problems had become more apparent in the language group. The authors then completed the study when the participants were aged, on average, 23-24 years. The findings indicated that verbal IQ and receptive language scores had improved significantly more in the autism group than in the language group over time. Moreover, the language group were less severely impaired in their social use of language, many showed a number of abnormal features in this domain. There were no differences between the groups on tests of reading or spelling. Early language ability appeared to be related to outcome in the autism group, however in the language group there was little association between measures of childhood functioning and later progress.

Shriberg *et al.* compared speech and prosody-voice profiles of fifteen male speakers with high functioning autism, fifteen male speakers with Asperger's syndrome and fifty three typically developing male speakers in the same ten to fifty years age range [12]. Compared to the typically developing speakers, significantly more participants in both high functioning autism and Asperger's syndrome groups had residual articulation distortion errors, uncodeable utterances due to discourse constraints, and utterances coded as inappropriate in the domains of phrasing, stress and resonance. Speakers with Asperger's syndrome were significantly more voluble than speakers with high functioning autism (depending upon the criteria at the

time), but otherwise there were few statistically significant differences between the two groups of speakers with pervasive developmental disorders.

Koning and Magill-Evans studied social and language skills in adolescent boys aged 12 to 15 with Asperger's syndrome [13]. 21 adolescent boys with Asperger's syndrome and 21 boys matched on age and estimate of IQ were assessed using standardised measures of social perception, social skills, number of close friends and frequency of contact and expressive and receptive language. There were significant differences between groups on all measures including receptive language. The authors concluded that clinically and statistically significant differences between the groups suggest the need to focus on specific deficits.

Peppe *et al.* studied a group of children to identify the nature and extent of receptive and expressive prosodic deficits in children with high functioning autism [14]. They studied 31 high functioning autistic children matched with 72 typically developing children and 33 adults with normal speech. They concluded that the study demonstrated receptive and expressive prosodic skills were closely associated in high functioning autism. They said that receptive prosodic skills would be an appropriate focus for clinical intervention and further investigation of prosody and the relationship between prosody and social skills is warranted. Although the study involved children aged under 12, the findings are likely to be relevant to adolescents and adults.

Loukusa and Moilanen reviewed studies involving pragmatic language comprehension and inference abilities in individuals with Asperger's syndrome or high functioning autism [15]. Identified studies included participants varying school aged children to older adults. They found that the pragmatic comprehension and inference abilities measured varied from homograph comprehension to ability to understand non-literal statements. Pragmatic inference weaknesses, but not inabilities, were found throughout the studies. The researchers however did not wholly agree on the reasons and the extent of processing difficulties. They also found that the most commonly suggested explanation for pragmatic inference deficits were theory of mind and central coherence.

Although there are a fewer studies examining pragmatics of language and impairments in adolescents and young adults with higher functioning autism, evidence shows that pragmatic deficits are present in varying degrees. Many adults on higher functioning end of the spectrum may not show deficits in comprehension. However, they often present with semantic and pragmatic deficits. This may show as difficulties in initiating and sustaining conversations, turn taking and in prosody.

NEUROLOGICAL BASIS

Pragmatic language deficits are common to a number of neurological disorders including right hemisphere damage, autism and traumatic brain injury, which may give an indication to the biological origins of pragmatic language deficits. Some studies have explored the neurological aspects of autism.

McAlonan *et al.* (studied twelve individuals with Asperger's syndrome with fourteen controls [16]. They found significant age related differences in volumes of cerebral hemispheres and caudate nuclei (controls but not people with Asperger's syndrome, had age-related reductions in volume). Those with Asperger's syndrome had significantly less grey matter in frontal-striatal, cerebellar regions and widespread differences in white matter. Sensory motor gaiting was significantly impaired in Asperger's syndrome. McAlonan *et al.* hypothesised that Asperger's syndrome is associated with abnormalities in frontal-striatal pathways resulting in defective sensory motor gaiting and consequently characteristic difficulties inhibiting repetitive thoughts, speech and actions [16].

Korpilahti *et al.* evaluated discrimination of speech prosody in boys (aged 9 to 12) with Asperger's syndrome and their fathers at neurophysiological level [17]. Detection of prosody was investigated in one-word utterances and their mismatch negativity (MMN) of auditory event-related potentials (ERPs). Data was compared with that of typically developed boys and their fathers. The results suggested atypical neural responses to affective prosody in children with Asperger's syndrome and their fathers, especially over the right hemisphere, and that this impairment can already be seen at low-level information processes. The authors concluded that the results provided evidence for familial patterns of abnormal auditory brain reactions to prosodic features of speech.

Allen and Courchesne found that functionally, in autism, cerebellar activation is abnormally low during a task of selective attention [18]. Allen *et al.* found that cerebellar activation is abnormally high during a simple motor task [19].

While evidence of neurological basis is developing, it is not at a stage where imaging or other studies can help in assessment of pragmatic skills yet. It should be noted however, neurological basis may not be the only reason for pragmatic language deficits in autism spectrum disorders.

ASSESSMENT OF PRAGMATIC SKILLS

Due to the diverse nature of level of functioning, language development and pragmatic deficits among those with higher functioning autism or Asperger's syndrome, assessment of pragmatic skills presents with considerable difficulties.

Landa observed that valid assessment of pragmatic skills requires observation of an individual in a dynamic social context and that most aspects of pragmatic function were difficult to assess, if not impossible, using highly structured formats [8]. She wrote that pragmatic skills interventions should be based on assessment of cognitive, social, language and communication skills. She said that two normed tests namely Test of Language, Test of Language Competence (TLC; Wiig and Secord, and Test of Problem Solving (Zachman *et al.,*) are useful in pragmatic competence assessment [20-21]. The TLC test utilises several areas including multiple meaning words/sentencing, formulating sentences with content appropriate to the picture context, making influences and interpreting figures of speech. Minshew *et al.* found that this test differentiated high functioning adolescents and adults from individually matched controls [9].

In children, Adams conducted a review of formal and informal testing methods and pragmatic analytic procedures [22]. She concluded that a core set of pragmatic assessment tools can be identified, however further evaluation was required to establish standards in order to measure development of pragmatic ability, particularly with respect to their understanding of influence, topic management and coherence. She observed that there was a lack of reliability and validity in some of language pragmatics assessments. For older children assessments should include a comprehensive investigation of speech acts, conversational and narrative abilities. She also recommended that for older children the assessments should include understanding of implications and intent as well as the child's ability to employ contextual cues to understanding. She felt this would apply to adults with Asperger's syndrome as well.

There is no evidence available regarding the validity of assessment tools in young adults. There is also a lack of consensus regarding methods of assessments. Such tools and methods are essential in designing pragmatic speech interventions in young adults. Young adults, especially those who were diagnosed late in their teens with Asperger's syndrome or higher functioning autism may not have had any standardised assessments at all and present to adult services. This presents a number of challenges to professionals working adult services to identify deficits and plan appropriate interventions. There are relatively fewer speech and language therapists working with adults and standardised assessments would assist them and other professionals who deal with adults on high functioning end of autism spectrum.

It is important to recognise that many adults with high functioning autism have adjusted well to their varying level of deficits and may not require any interventions. However, understanding the deficits and making effective treatment interventions available for those in need would enhance the quality of their lives.

Eales wrote that the term 'pragmatics' is given a very wide reference by some authors, sometimes even approximating in meaning to 'social behaviour' [10]. When it is used in this manner, differentiation between pragmatic impairment and deficiencies in more general social skills become problematic. In his study, the term was used in more restricted manner.

INTERVENTIONS FOR PRAGMATICS AND EFFICACY

Language (both receptive and expressive) and communication are the basis to social skills. There is evidence that the language impairment is a key underlying pathology that affects the individuals' ability in social communication. This is further affected by receptive language deficits, weak central coherence and deficits in theory of mind.

It is impossible to separate how much of weak central coherence, poor social awareness, poor ability to empathise and understand others perspective (theory of mind) and pragmatic language deficits are affecting an individual's social skills ability in the presence of autism. It is likely that the ratio of deficits would be unique to the individual. From the available evidence, it seems unlikely that social skills development can be considered as a completely separate entity from pragmatic language deficits.

Interventions that are designed to strengthen pragmatic skills among those with autism would improve their social interactions and long term adjustment. There are a number of interventions tried in younger children. For adolescents and adults with higher functioning autism / Asperger's syndrome however, there are very few interventions described in literature.

Landa wrote that the need for socially based communication and language intervention with high functioning individuals on autism spectrum is substantial, despite them possessing clear articulation and production of grammatically intact sentences [8].

White *et al.* reviewed group based social skills training programmes for school age children and adolescents with autism spectrum disorder [23]. They reviewed all published studies of group social skills interventions between 1985 and 2006. They identified fourteen studies (of which four had participants aged 12 or above) and analysed them. They concluded that their empirical support for such interventions was incomplete but noted that promising intervention strategies were identified. In children and adolescents, they concluded that there is a need to develop and test structured, manual based curricula. They said that structured interventions are essential for replication and recommended multi-sight feasibility studies.

Literature search shows that there is little or no consensus on pragmatic interventions used in adolescents and adults. There is also a paucity of standardised assessment tools to evaluate pragmatic language deficits. There are a few standardised assessments and interventions, particularly in children. However, none are available for adults.

Tse *et al.* evaluated the high effectiveness of social skills training group for adolescents with Asperger's syndrome and high functioning autism [24]. Parents of six groups of adolescents (N=46, 61% male, mean age 14.6) completed questionnaires immediately before and after the twelve week group. Parents and adolescents were surveyed regarding the group. Significant pre-post treatment gains were found on measures of both social competence and problem behaviours associated with Asperger's syndrome and high functioning autism. Effect sizes ranged from 0.34 to 0.72. Adolescents reported more perceived skill improvements than did parents. Parent-reported-improvement suggested that social skills learned in group sessions generalise to settings outside the treatment group. They recommended, controlled studies of social skills training groups in larger settings would be valuable.

Cappadocia and Weiss conducted a literature review to investigate the empirical validity of social skills interventions used with Asperger's syndrome and high functioning autism populations [25]. The literature review compared three types of social skills training groups; traditional, cognitive-behavioural and parent-inclusive. The traditional type of intervention studies had been conducted in children aged 12 to 18. The authors concluded that the studies provided preliminary evidence for the efficacy of group-based social skills interventions among children and youth diagnosed with autism spectrum disorders, although few used comparison group or randomised control trial designs.

CONCLUSIONS

There are a number of adolescents and young adults who are diagnosed with Asperger's syndrome or higher functioning autism for the first time in their lives during their teenage years. There is a paucity of standardised tools to measure deficits in adults and even fewer standardised interventions.

Interventions for those with high functioning autism or Asperger's syndrome that focus upon pragmatics, assertiveness, elements of speech discourse, body language and social skills should be adapted to individual needs.

Many professionals, particularly speech and language therapists are involved in delivery of pragmatic skills interventions, assertiveness skills interventions and social communication interventions in both individual and group settings. This is often combined with psychosocial interventions focusing on raising awareness of individuals' awareness of their strengths and deficits, problem solving skills and in improving their ability to cope with social situations.

Some individuals especially those later in their life span may not benefit from social skills and speech therapy interventions. However, for those who are relatively young in their teenage years or in the first two to three decades of life, this may be an invaluable intervention that would make considerable difference to their lives.

Assessments to determine areas of need in adolescents and young adults should be standardised. This would assist therapists to plan interventions and to

measure effectiveness. Large-scale studies comparing effectiveness of pragmatic interventions would be invaluable to adults with autism and professionals involved.

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