Research in Autism Spectrum Disorders 4 (2010) 612–618

Contents lists available at ScienceDirect

Research in Autism Spectrum Disorders

Journal homepage: http://ees.elsevier.com/RASD/default.asp

Adults with Asperger syndrome with and without a cognitive profile associated with "non-verbal learning disability." A brief report

Agneta Nydén [a,*], Lena Niklasson [a], Ola Ståhlberg [b], Henrik Anckarsäter [c,d], Annika Dahlgren-Sandberg [b], Elisabet Wentz [e], Maria Råstam [f]

[a] Institute of Neuroscience and Physiology, Child and Adolescent Psychiatry, Sahlgrenska Academy at the University of Gothenburg, Sweden
[b] Department of Psychology, University of Gothenburg, Sweden
[c] Institute of Neuroscience and Physiology, Forensic Psychiatry, Sahlgrenska Academy at the University of Gothenburg, Sweden
[d] Forensic Psychiatry, Psychiatry Skåne, Lund University, Malmö, Sweden
[e] Vårdal Institute, Swedish Institute of Health Sciences, Sweden
[f] Department of Clinical Sciences, Lund, Child and Adolescent Psychiatry, Lund University, Sweden

ARTICLE INFO

Article history:
Received 27 November 2009
Accepted 17 December 2009

Keywords:
Adults
Asperger syndrome
Neuropsychology
Non-verbal learning disability

ABSTRACT

Asperger syndrome (AS) and non-verbal learning disability (NLD) are both characterized by impairments in motor coordination, visuo-perceptual abilities, pragmatics and comprehension of language and social understanding. NLD is also defined as a learning disorder affecting functions in the right cerebral hemisphere. The present study investigates if individuals with AS and a cognitive profile consistent with NLD (i.e. verbal IQ > performance IQ) would also have other problems inherent in NLD, visual memory and attention, reading/writing ability and arithmetic in the presence of preserved verbal memory and attention. Forty-four individuals with AS were assessed with a battery of neuropsychological tests. Reading/writing and arithmetic abilities were investigated. Education and global social adaptive levels were studied. Very few AS participants, even though with NLD cognitive profile showed problems with any of the neurocognitive abilities or academic achievements. However, all had poor global social adaptive functioning and few had paid employment, regardless of their cognitive profile. The present study suggests that AS and NLD are two different conditions even though some individuals in both groups have the verbal IQ > performance IQ profile that has been proposed to be typical of both AS and NLD.

Asperger syndrome (AS) and non-verbal learning disability (NLD) are both characterized by impairments in motor skills and coordination, visuo-perceptual abilities, pragmatics and comprehension of language, social understanding and non-verbal communication, in combination with strengths in mechanical language skills and good rote memory (Gillberg, 1989; Rourke, 1985; Rourke et al., 2002; Wing, 1986).

AS is behaviourally defined on the basis of unusual behaviours and impairments, affecting social life, school performance, and capacity for work and independent adult living. The diagnosis is based on operationalized criteria as set out, for instance, in the DSM-IV (APA, 1994). It is a developmental disorder with childhood onset and prospective, longitudinal follow-up studies show that 80–95% will fulfil criteria for a diagnosis of AS in adult life (Billstedt, Gillberg, & Gillberg, 2005; Cederlund & Gillberg, 2004; McGovern & Sigman, 2005). There is overwhelming evidence of a genetic component in AS (Gillberg, 2006;

* Corresponding author at: Institute of Neuroscience and Physiology, Child and Adolescent Psychiatry, Sahlgrenska Academy at the University of Gothenburg, Otterhallegatan 12, 411 18 Goteborg, Sweden.
E-mail address: agneta.nyden@vgregion.se (A. Nydén).

1750-9467/$ – see front matter © 2010 Published by Elsevier Ltd.
doi:10.1016/j.rasd.2009.12.004

Goussé et al., 2002; Szatmari, Jones, Zwaigenbaum, & MacLean, 1998). Studies of cerebral dysfunction indicate that multiple regions of the brain are affected (Tonn & Obrutz, 2005).

NLD is characterized by higher verbal IQ (VIQ) than performance IQ (PIQ), primary deficits in tactile-perception and coordination, deficits in novel problem solving, concept formation and social perception and judgement (Rourke et al., 2002). NLD is defined as a learning disorder and the primary deficits lead to secondary deficits in tactile and visual attention, tactile and visual memory. The meaning and pragmatics of language is also affected. Assets are found in auditory perception, verbal memory and verbal attention. The neuropsychological deficits affect also academic learning with poor reading comprehension and arithmetic (Rourke et al., 2002). The diagnostic criteria are specified for different age groups, and characteristics are described for younger individuals (up to six years) and for older individuals (seven years and above) (Colomé, Sans, Lopez-Sala, & Boix, 2009; Rourke et al., 2002; Rourke, Ahmad, & Collins, 2003). NLD involves dysfunction of the white matter. The right hemisphere is functionally more dependent on the white matter, so impairments are mostly seen in functions associated with the right hemisphere (Myklebust, 1975; Rourke et al., 2002). Neuropsychological studies exploring the signs and symptoms of NLD in respect of VIQ and PIQ discrepancies, memory and attention have shown mixed results (Ehlers et al., 1997; Ghaziuddin & Mountain-Kimchi, 2004; Gras-Vincendon, Bursztein, & Danion, 2008; Klin, Volkmar, Sparrow, Cicchetti, & Rourke, 1995; Nydén, Gillberg, Hjelmquist, & Heiman 1999; Rourke, 1985).

On neuropsychological testing, uneven intellectual abilities, with VIQ significantly higher than PIQ, have been over-represented in children with AS (Ehlers et al., 1997; Ghaziuddin & Mountain-Kimchi, 2004; Klin et al., 1995; Rourke, 1985). In a study by Cederlund and Gillberg (2004) just over half of 100 males aged 5–24 years with Asperger syndrome were found to have VIQ > PIQ difference of more than 15 IQ scores.

Studies of memory in children with autism have not shown primary memory problems, but problems handling material of increased complexity (Gras-Vincendon et al., 2008). Differences between verbal, visual and tactile memory have not been compared. Broad attentional deficits have been found in children with AS (Nydén et al., 1999).

Mechanical language skills (single-word reading and spelling) seem to be intact in both NLD and AS (Ellis & Gunter, 1999; Klin et al., 1995), while comprehension of text seems to be impaired (Ellis & Gunter, 1999; Klin et al., 1995).

Comparing neuropsychological profiles of children with AS and NLD in a small study, the AS group was found to have more impairment of linguistic and non-verbal skills, and to be more dysfunctional with regard to executive functions than the NLD group (Gavilán, Fournier-Del Castillo, & Bernabeu-Verdú, 2007). Investigating Wechlers IQ profiles of children and adults with high-functioning autism (HFA), a recent study found the VIQ > PIQ profile typical of NLD to be more common in HFA than in controls without ASD (Williams, Goldstein, Kojkowski, & Minshew, 2008). The authors concluded that IQ profiles alone cannot be used for discrimination between NLD and HFA.

Ryburn, Anderson and Wales (2009) investigated children with AS with a battery of neuropsychological tests sensitive to NLD, to examine to what extent the neuropsychological profile coincide with that of the NLD syndrome. The children with AS did not score low on spatial or problem-solving tasks typical of NLD, but their psychosocial difficulties, typical of AS, seem to be in line with the symptoms of NLD. The authors did not find the NLD concept to be useful in describing neuropsychological difficulties and strengths associated with AS.

One important reason for diagnosing developmental disorders is to (i) give a description of different criteria fulfilled and (ii) increase the understanding of the consequences of the developmental disorder. It is unclear what impact the combination of AS and the NLD phenotype (VIQ > PIQ) has on social and cognitive characteristics, and if the additional diagnosis of NLD in this proposed subgroup of AS would contribute to a better understanding of this developmental disorder. It is therefore of great clinical importance to compare the neuropsychiatric diagnosis of AS and the neuropsychological diagnosis of NLD in respect of differential characteristics and communalities described as assets and deficits in the NLD syndrome.

In the present study we thus wanted to investigate neuropsychological functioning in adults in an AS–NLD group, characterized by a significantly higher verbal than performance quotient. We hypothesized that fewer individuals in the AS–NLD (VIQ > PIQ) group would have more problems with verbal memory and attention than individuals without that verbal predominant profile. Further, we expected to find more problems with visuo-spatial memory and visual attention, and to find more individuals in the AS–NLD group (VIQ > PIQ) to have problems with comprehension in reading and writing, and arithmetic difficulties. Finally, we wanted to compare the two groups in respect of some psychosocial characteristics, such as education, economic support, and global social adaptive functioning.

1. Method

1.1. Participants

As part of the Neuro-Psychiatric Genetics project (NPG), 273 adults were referred for assessment of possible childhood onset neurodevelopmental problems (autism, AS, pervasive developmental disorder not otherwise specified (PDD NOS), attention deficit/hyperactive disorder (ADHD), tic disorders, and various kinds of learning disorders). The study was carried out at the Child Neuropsychiatric Clinic in Göteborg, the second largest city in Sweden (Anckarsäter et al., 2006), which at that time was the only clinic for assessment of autism spectrum disorders (ASD) in adults. Some of these patients were self-referred or referred from general practitioners, but 59% were secondary or tertiary referrals from adult psychiatry specialists. With few exceptions, they had not been diagnosed with ASD in childhood. Instead, the childhood onset neurodevelopmental