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Cognitive profile in adults with Asperger syndrome using WAIS-IV: Comparison to typical adults

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ABSTRACT

Previous studies have identified areas of cognitive weakness in children diagnosed with Asperger's syndrome (AS). However, there are few studies on people with AS diagnosed during adulthood, comparing their cognitive profile to typical adults. In this study, we have compared cognitive profile in 16 adults with AS and 16 adults with typical development. The new WAIS-IV was used to examine cognitive functioning of participants. Our results showed AS group had significant impairments on Processing Speed Index. At the subscale level, a weakness was highlighted in Symbol Search. Furthermore, a process score analysis revealed working memory impairment on the Sequencing condition of Digit Span subtest. Clinical applications of these findings are discussed in the light of scientific literature.
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1. Introduction

Asperger's syndrome (AS) was a subtype of pervasive developmental disorders (PDD) through the ICD-10 (WHO, 1994), DSM-IV (APA, 1994) and DSM-IV-TR (APA, 2000). This syndrome was defined as a qualitative impairment in social interaction, with restricted patterns of behaviours and interests in people who did not show significant delay in language and cognitive development. Due to the ambiguity surrounding the boundaries of the subcategories of PDD, these were abandoned in favour of one dimensional category that is autism spectrum disorders (ASD). Even though DSM-5 criteria alter the composition of autism spectrum by abandoning the AS category, the existence and definition of Asperger's syndrome are still debated. According to McPortland, Reichow and Volkmar (2012), compared to DSM-IV criteria, DSM-5 criteria improve specificity but exclude a substantial portion of cognitively able individuals, as well as those with ASD other than autistic disorder (particularly people with AS). These people would be less likely to receive a diagnosis on the autism spectrum, suggesting a potential denial of individuals with subthreshold disabilities. Furthermore, exclusion of people with AS from the ASD raises fears of difficulties to access medical or social services (Tsai & Ghaziuddin, 2014).

The aim of the current study was to contribute to the debate: do AS people differ from healthy people on their cognitive profile? Many studies compared the symptom patterns and cognitive abilities of adults with different developmental disorders (de Boer, Spek, & Lobbestael, 2014; Goldstein, Johnson, & Minshew, 2001), or compared those of AS adults to adults with other PDD (HFA or PDD- Not Otherwise Specified) (Kanai et al., 2012; Koyama, Tachimori, Osada, Takeda, & Kurita, 2007;

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Soulières, Dawson, Gernsbacher, & Mottron, 2011). However, comparison of people with AS to a control group, typically developed, remains unusual. Most of researches using WAIS-R (Jolliffe & Baron-Cohen, 1997, 1999; Pijnacker, Hagoort, Buitelaar, Teunisse, & Geurts, 2009) or WAIS-III / WISC-III (de Boer et al., 2014; Sahyoun, Soulières, Belliveau, Mottron, & Mody, 2009; Spek, Scholte, & Van Berckelaer-Onnes, 2010; Zalla et al., 2014) failed to differentiate an AS group from a control group of adults. Only one study based on the new version of Wechsler scale 4th edition (Wechsler, 2008) provided additional information about cognitive profile of AS adults compared to a control group (Holdnack, Goldstein, & Drozdick, 2011). These authors observed a global functioning similar to those of control group, but AS adults performed worse than typical adults on the subtests designed to assess information processing speed (Coding and Symbol Search). Their results also suggested the presence of cognitive heterogeneity associated with AS, with some individuals performing like typical individuals, whereas others performed like the HFA individuals (Holdnack et al., 2011). Children with AS also had a significantly lower mean score on Coding subtest (WISC-III scale) than subjects with HFA and those with typical development. According to some authors (Kaland, 2011; Koyama et al., 2007), this may be a specific feature of AS. The results of our study will allow to validate or not these data.

Cognitive profile of AS children and AS adolescents is well documented by numerous studies. A great number of comparative studies between children with AS and children with HFA showed that, in children with AS, verbal IQ (VIQ) has often been found to be significantly higher than performance IQ (PIQ). This difference tended to be reversed in children with high-functioning autism: their scores were better on PIQ than on VIQ (Chan, Hu, Cui, Wang, & McAlonan, 2011; Ghaziuddin & Mountain-Kimchi, 2004; Klin, Volkmar, Sparrow, Cicchetti, & Rourke, 1995; Planche & Lemonnier, 2012). These findings seemed to be legitimately connected to language acquisition, which was delayed only in subjects with HFA, but not in those with AS according to the DSM IV and the ICD-10 used for including the subjects in the groups (Planche & Lemonnier, 2012). In a recent meta-analysis, Chiang, Tsai, Cheung, Brown and Li (2014) examined differences between VIQ and PIQ in AS individuals, in sample ages across studies ranged from 5 to 58. Thirty-four out of 38 (89%) studies reported that VIQ was higher than PIQ in AS individuals. Four out of 38 (11%) studies reported that PIQ was higher than VIQ in AS individuals, but none of these four studies showed significant differences. Few studies demonstrated a discrepancy in favour of PIQ (Speirs, Yelland, Rinehart, & Tonge, 2011) or the lack of dissociation (Ozonoff, Rogers, & Pennington, 1991) between these populations.

Studies about the cognitive profile in AS adults are less numerous, resulting from different situations. Diagnosis of AS is often delayed because of the child's apparent intellectual ability or extensive knowledge about a particular area or topic (Barnhill, 2007). One could argue that increased knowledge about AS and media coverage (Pourre, Aubert, Andanson, & Raynaud, 2012) lead more and more individuals to initiate a diagnosis procedure at adulthood.

Concerning cognitive profile of AS adults based on Wechsler scale, few studies revealed a VIQ-PIQ discrepancy in favour of VIQ in AS adulthood (Kanai et al., 2012; Soulières et al., 2011). On the recent meta-analysis of Chiang et al. (2014), only 6 of the 38 studies about cognitive profile in AS concerned adults and only 3 of them (Baron-Cohen, 2000; Jolliffe & Baron-Cohen, 2000; Kanai et al., 2012; Sahyoun et al., 2009) noted a significant difference between VIQ and PIQ. In Kanai et al. (2012), these differences did not appear as specific of AS individuals but common in all PDD individuals (concerning 79% of AS, 75% of High Functioning Autism or HFA and 78% of PDD-NOS). For Ambery, Russell, Perry, Morris and Murphy (2006), AS individuals were more likely to have a significant VIQ-PIQ discrepancy than control group (59% versus 25%). But this could be in both directions: either VIQ > PIQ or PIQ > VIQ. Many authors suggested that VIQ/PIQ difference did not appear as a reliable indicator in AS adults (Spek, Scholte, & van Berckelaer-Onnes, 2008).

When IQ was stable over time, the difference between VIQ and PIQ tended to decrease. Indeed, in a prospective follow-up study, Cederlund, Hagberg, Billstedt, Gillberg and Gillberg (2008) indicated no decline in Full Scale Intelligence Quotient (FSIQ) in the AS group. However, at original diagnosis, 45% of individuals presented 15 IQ-points difference (or more) between verbal and non-verbal abilities, while they were only 19% more than 5 years later. Performance IQ tended to improve over time. The mean VIQ > PIQ difference of 11 IQ-points (or more) at original diagnosis was no longer observed at follow-up diagnosis. For Cederlund et al. (2008), this result might reveal an improvement in visual-spatial ability over time (involved as a part of the PIQ).

In the field of executive functions, many studies have been conducted in autism in the last twenty years. The majority of them have stated that, in comparison with typically developing subjects, individuals with autism perform poorly in tasks involving multiple executive – control processes simultaneously (Kenworthy, Yerys, Anthony, & Wallace, 2008). Clinicians and family members usually agree that individuals with autism have difficulties in efficiently mobilizing executive functions in their daily life. Children with autism have problems with planning, cognitive flexibility or set-shifting and working memory (Bishop & Norbury, 2005; Ozonoff et al., 2004; Ozonoff & Jensen, 1999; Pennington et al., 1997; Verté, Geurts, Roeyers, Oosterlaan, & Sergeant, 2005). These impairments are also described in adults with AS (Ambery, Russell, Perry, Morris, & Murphy, 2006; Barbalat, Leboyer, & Zalla, 2014; Hill, 2004; McCrimmon, Schwean, Saklofske, Montgomery, & Brady, 2012). Some researchers consider the executive dysfunction as a primary deficit in autism (Ozonoff et al., 1991). Given the close link between executive functions and frontal lobe, it is assumed that executive dysfunction in autism could be explained by neurodevelopmental peculiarities encountered in autism, particularly frontal lobe and fronto-striatal pathway impairments (Abell et al., 1999; McAlonan et al., 2002).

Despite increasing number of studies about AS at adulthood, results are not sufficient to achieve an accurate representation of cognitive functioning in AS adults. In most studies comparing AS adults to typical adults, age range remains wide. Samples include children, adolescents and ageing adults in the same group. Being a neurodeveloppemental disorder,

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