Cognitive profiles of adults with high-functioning autism spectrum disorder and those with attention-deficit/hyperactivity disorder based on the WAIS-III

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ABSTRACT

The cognitive profile differences between adult patients with autism spectrum disorder (ASD) and those with attention-deficit/hyperactivity disorder (ADHD) are not well characterized. We examined the cognitive profiles of adults having either ASD (n = 120) or ADHD (n = 76) with no intellectual disabilities (IQ ≥ 70) using the Wechsler Intelligence Scale III (WAIS-III). Verbal Intelligence (VIQ) — Performance Intelligence (PIQ) difference discrepancies were detected between the two groups. Information subtest scores of the Verbal Comprehension index and Arithmetic and Digit Span subtests of the Freedom from Distractibility index were significantly higher in ASD than in ADHD, while the Picture Completion subtest was significantly lower in ASD. To our knowledge, this is the first study to evaluate the difference in the cognitive profiles of adults with ASD and those with ADHD based on the WAIS III with a large number of participants.

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1. Introduction

Autism spectrum disorder (ASD) and attention-deficit/hyperactivity disorder (ADHD) are neurodevelopmental disorders. ASD is characterized by markedly abnormal or impaired development in social communication, a restricted and stereotyped repertoire of activities and interests, and atypical responses to sensory stimuli. ADHD is characterized by severe inattention, hyperactivity, and impulsivity (American Psychiatric Association, 2013). The prevalence rates of ASD and ADHD are approximately 1% and 5%, respectively (Centers for Disease Control (CDC), 2014; Kadesjö & Gillberg, 1999). Therefore, both disorders have recently attracted great attention.

Some children with ASD or ADHD exhibit no apparent symptoms, making it difficult to reliably diagnose the disorders during childhood. Children with ASD or ADHD might be diagnosed in adulthood for the first time when the symptoms become
more evident (McGovern, & Sigman, 2005; Wilens, Biederman, & Spencer, 2002). Therefore, studies of the cognitive functions of adults in both diagnosis groups are needed (Nydén et al., 2010). A clearer understanding of the cognitive functions of adults with ASD and ADHD could be useful for clinical settings, and facilitate the development of daycare programs. In addition, this information would help family members and coworkers better understand how to provide effective support to those with ASD and ADHD based on their cognitive strengths and weaknesses.

Distinguishing between ASD and ADHD in adults is difficult, however, especially when these disorders are not associated with any intellectual disability. Because primary caregivers often remember only portions of a patient’s developmental history during childhood, it is difficult to collect complete and accurate information to facilitate a differential diagnosis of ASD and ADHD in adults (Kanai et al., 2012). Efficient indicators for a precise diagnosis by distinguishing between ASD and ADHD are important in clinical settings.

The Wechsler Intelligence test is one of the most widely used behavioral tests for examining cognitive profiles of children and adults, and it has been translated into many languages, including Japanese. The Wechsler Adult Intelligence Scale—Third Edition (WAIS-III) is the latest available version in Japanese although the Wechsler Adult Intelligence Scale—Fourth Edition (WAIS-IV) is now available in other countries (Kanai, Toth, Itahashi, Hashimoto, & Kato, 2016). Determining the cognitive profiles based on the Wechsler Intelligence test, comparing full intelligence (FIQ), verbal intelligence (VIQ), and performance intelligence (PIQ), and index and subtest score profiles between ASD and ADHD groups will be helpful for differentiating between ASD and ADHD in adults.

VIQ–PIQ differences are considered to be an efficient indicator for distinguishing between ASD and ADHD (Spek, Scholte, & van Berckelaer-Onnes, 2008). Adolescents with ASD have a higher VIQ than PIQ (Cederlund & Gilberg, 2010; Ghaziuddin & Mountain-Kimchi, 2004; Kanai et al., 2012). Conversely, some studies of intellectual ability reported no VIQ and PIQ differences in ASD (Scheirs & Timmers, 2009). Laasonen, Leppämäki, Tani, and Hokkanen (2009) reported lower PIQ in 30 adults with ADHD than in 40 normal adults controls. There is currently no clear consensus regarding the VIQ–PIQ differences between adults with ASD and ADHD.

At both the factor index and subscale levels, processing speed problems are commonly observed in adults with ASD and ADHD having no intellectual disability (Spek et al., 2008; Seidman, 2006; Woods, Lovejoy, & Ball, 2002). Both clinical groups have lower scores in Digit Symbol Coding subscales (Hervey, Epstein, & Curry, 2004; Spek et al., 2008). Nydén et al. (2010) also found higher Verbal Comprehension scores in adults with ASD than in those with ADHD or in those with ASD comorbid with ADHD based on the Wechsler Adult Intelligence Scale—Revised (WAIS-R), which is the previous version of the WAIS-III. Kanai et al. (2012) and Spek et al. (2008) reported good verbal abilities in adults with ASD.

Consistent with the view that working memory is deficient in ADHD (Gregory et al., 2010; Hervey et al., 2004; Rapport et al., 2008), the Freedom from Distractibility score, which is related to working memory, is lower in adults with ADHD than in those with ASD. Arithmetic subscale scores, in particular, are lower in adults with ADHD than in those with ASD (Nydén et al., 2010; Hervey et al., 2004). Previous studies of adults with ASD and adults with ADHD indicated good verbal abilities in ASD, poor working memory in ADHD, and processing speed problems in both diagnostic groups. To our knowledge, however, few studies have examined differences in the WAIS-III subtest scores between adults with ASD and ADHD.

Although several studies have identified the cognitive profiles of children with ASD or ADHD based on Wechsler Intelligence Scale for Children (WISC) (Matsuura et al., 2014; Ehlers et al., 1997; Mayes & Calhoun, 2008; Scheirs & Timmers, 2009), little is known about the cognitive characteristic between adults with ASD and those with ADHD with no intellectual disability based on WAIS-III. In addition, the cognitive characteristics of adults with ASD and those with ADHD have not yet been clarified in a large sample. Elucidating the cognitive patterns of adults with ASD and those with ADHD based on the WAIS-III is important for distinguishing the cognitive features of ASD and ADHD in the clinical setting.

2. Methods

2.1. Participants and procedure

All participating patients provided written consent prior to completing the questionnaires and testing in the study, which was approved by the ethics committee of the Faculty of Medicine of Showa University.

The clinical group in this study comprised 196 outpatients (ASD: 120, ADHD: 76) at Showa University Hospital (mean age, 29.9 years [range, 18–60]; 144 men and 52 women) attending a diagnostic outpatient clinic for adults 18 years of age and older with suspected ASD. All participants were referred by physicians from other clinics. Inclusion criteria were WAIS-III FIQ >70; age of 18–60 years; no current use of anti-psychotics; and formal diagnosis of ASD or ADHD based on the DSM-IV–TR (American Psychiatric Association, 2000). Exclusion criteria were comorbid psychiatric disorders based on the DSM-IV–TR Axis I and II. All participants were asked to complete an interview sheet before clinical examination at the initial visit. The interview sheet comprised five main questions regarding: 1. the major complaint; 2. history of visits to medical and educational organizations/consultation services; 3. problems during the fetal and newborn period; 4. developmental delays (walking and language); and 5. education and occupation of the patient and their parents. The patients were also required to bring school records covering elementary school through high school and a maternal and child health handbook. The maternal and child health handbook includes records of pregnancy, childbirth, and the neonatal and infant periods, and are provided by the local government office in Japan.
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