Cognitive profiles of adults with Asperger's disorder, high-functioning autism, and pervasive developmental disorder not otherwise specified based on the WAIS-III

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ABSTRACT

Little is known about the cognitive profiles of high-functioning Pervasive Developmental Disorders (PDD) in adults based on the Wechsler Intelligence Scale III (WAIS-III). We examined cognitive profiles of adults with no intellectual disability (IQ > 70), and in adults with Asperger's disorder (AS; $n = 47$), high-functioning autism (HFA; $n = 24$), and pervasive developmental disorder not otherwise specified (PDDNOS; $n = 51$) using the WAIS-III. Verbal Intelligence (VIQ)–Performance Intelligence (PIQ) differences were detected between the three groups. Full Intelligence (FIQ) and VIQ scores were significantly higher in AS than in HFA and PDDNOS. Vocabulary, Information, and Comprehension subtest scores in the Verbal Comprehension index were significantly higher in AS than in the other subgroups, while Digit-Symbol Coding and Symbol Search subtest scores in the Processing Speed index were significantly lower in HFA. The findings demonstrated cognitive profiles characteristic of adults with high-functioning PDD.

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1. Introduction

Based on the Diagnostic and Statistical Manual of Mental Disorders (DSM-IV-TR; American Psychiatric Association, 2000) and the International Classification of Diseases (ICD-10; World Health Organization, 1993), Pervasive Developmental Disorders (PDD) are characterized by markedly abnormal or impaired development in social interaction, a restricted and stereotyped repertoire of activities and interests, and a history of cognitive or language delay. The most common subtypes are Asperger's disorder (Asperger syndrome [AS]), Autism, and pervasive developmental disorder not otherwise specified (PDDNOS). AS is different from the other types of PDD in that communication ability is not impaired. PDD was once thought to be an extremely rare disorder, affecting 2–4 persons in a population of 10,000 (Pickles et al., 1995), but high-functioning (IQ ≥ 70) PDD has recently attracted great attention. Chakrabarti and Fombonne (2001) estimated that the prevalence of high-functioning PDD is 0.45%. According to a published epidemiologic study, the population prevalence of AS is 0.36% and suspected AS cases comprise 0.7% (Ehlers & Gillberg, 1993).

Diagnosing high-functioning PDD is difficult, however, especially in adults (Ritvo et al., 2008). Because some primary caregivers often remember only a portion of a patient's developmental history during early childhood, it is difficult to collect accurate information for a differential diagnosis of PDD in adults. High-functioning PDD in adults is also associated with

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other psychiatric disorders, such as depression, anxiety disorder, and schizotypal personality disorder (Cederlund, Hagberg, & Gillberg, 2010; Kanai, Iwanami, Hashimoto, et al., 2011; Kanai, Iwanami, Ota, et al., 2011; Mattila et al., 2010), making it difficult to distinguish between high-functioning PDD and other psychiatric disorders in adults. Therefore, efficient indicators for a precise diagnosis of high-functioning PDD are important in the clinical setting.

The Wechsler Intelligence test is one of the most widely used behavioral tests to examine cognitive profiles of children and adults and it has been translated into many languages, including Japanese. The Japanese version of the Wechsler Adult Intelligence Scale-Third Edition (WAIS-III) is a new version of the Wechsler Intelligence test for adults. Determining the cognitive profiles based on the Wechsler Intelligence test, comparing full intelligence (FIQ), verbal intelligence (VIQ), and performance intelligence (PIQ), and even index and subtest score profiles among high-functioning PDD groups will be helpful for diagnosing adults with high-functioning PDD.

VIQ–PIQ differences are considered to be an efficient indicator of PDD (Spek, Scholte, & van Berckelaer-Onnes, 2008). Cederlund and Gillberg (2010) reported that VIQ is higher than PIQ in adolescents with AS. Ghaziuddin and Mountain-Kimchi (2004), studying IQ profiles of 34 participants with high-functioning PDD (AS and HFA), found that both AS (82%) and HFA (50%) had a higher VIQ than PIQ. In the one study reported to date of WAIS-III profiles of adults with high-functioning PDD, no VIQ and PIQ differences were detected (Spek et al., 2008). Each of these previous studies, however, was performed with a relatively small number of samples. Therefore, it is important to clarify the VIQ–PIQ differences in a larger sample of adults with high-functioning PDD.

At the index level, Spek et al. (2008) found Processing Speed problems in adults with high-functioning PDD. Nydén et al. (2010) also found higher Verbal Comprehension and lower Perceptual Organization scores in adults with high-functioning PDD than in those with attention deficit hyperactivity disorder (ADHD) and PDD with ADHD traits groups based on the Wechsler Adult Intelligence Scale-Revised (WAIS-R), which is the previous version of the WAIS-III.

At the subscale level, Spek et al. (2008) reported high Comprehension and Block Design scores, and low Digit Span scores in adults with AS. In adults with HFA, Digit-Symbol Coding, Matrix Reasoning, and Symbol Search scores were relatively low, and the Information score was relatively high. Some studies of the WAIS or WAIS-R in adults with high-functioning PDD reported low Comprehension and high Block Design scores (Goldstein, Beers, Siegel, & Minshew, 2001; Rumsey & Hamburger, 1988).

Although some studies have identified the cognitive profiles of children with high-functioning PDD (Bölte, Dziobek, & Poustka, 2009; Ehlers et al., 1997; Koyama, Tachimori, Osada, & Kurita, 2006; Mayes & Calhoun, 2008; Scheirs & Timmers, 2009), little is known about the characteristics of adults with high-functioning PDD. In addition, the cognitive characteristics of adults with AS, high-functioning autism, and PDDNOS have not yet been clarified. While PDD includes subtypes based on the DSM-IV-TR, the clinical features of high-functioning PDD vary widely (Wing, Gould, & Gillberg, 2011). Elucidation of the cognitive patterns on the WAIS-III of the three types of high-functioning PDD is important for supporting a precise diagnosis in adults with high-functioning PDD.

In the present study, we clarified the different cognitive profiles on the WAIS-III among adults with no intellectual disability (IQ ≥ 70), and adults with AS, high-functioning autism, and PDDNOS, with large number of samples.

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 of this study comprised 122 outpatients at Showa University Hospital (Mean age, 29.4 years [range, 18–60]; 86 men and 36 women) attending a diagnostic outpatient clinic for adults 18 years of age and older with suspected PDD. All patients 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 PDD, including autistic disorder, AS, and PDDNOS based on the DSM-IV-TR. In addition, because PDDNOS is defined as a residual category of PDD and has no operational criteria, we used the ICD-10 for atypical autism, which requires that children either show abnormal or impaired development after 3 years of age or that they do not exhibit all three characteristics required for a diagnosis of autistic disorder (i.e., impairment in reciprocal social interaction, impairment in communication, and restricted/stereotyped behavior/interests). The former case [i.e., impaired development after 3 years of age] seems to be quite uncommon in our clinical experience. Exclusion criteria were comorbid psychiatric disorders based on the DSM-IV axes I and II. All patients 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.

To assess the presence of autistic traits, the Japanese version of the Autism-Spectrum Quotient (AQ) (Wakabayashi, Baron-Cohen, Wheelwright, & Tojo, 2006), developed originally by Baron-Cohen, Wheelwright, Skinner, Martin, and Clubley (2001), was administered to all patients before clinical examination. In the present study, a total AQ of 25 was the cut-off