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Neurocognitive characteristics of psychotic symptoms in young adults with high functioning autism

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ABSTRACT

Autism and schizophrenia are severe neurodevelopmental disorders. Recent findings from several studies suggest that these disorders share some common features at the biological, psychosocial and cognitive level. We have chosen to focus on a specific subgroup of autism spectrum disorders (ASD), individuals with high functioning autism (HFA), owing notably to the specific difficulties associated with differential diagnosis between individuals with autism and schizophrenia spectrum disorders (SSD) in the case of normal intelligence. In particular, we sought to investigate the extent to which neuropsychological and neurocognitive components could be specific in diagnosed participants with HFA who later developed SSD symptoms. We assessed a group of participants with HFA diagnosis and a group of participants who had first received an HFA diagnostic then were diagnosed with schizophrenia spectrum disorder during late adolescence. Results show that interference management is the most likely variable to discriminate the two groups. The findings are discussed in terms of similarities or discrepancies between ASD or SSD-like processes and clinical implications.

1. Introduction

Autism and schizophrenia are both severe neurodevelopmental disorders that were initially thought to be closely linked and were thus included in the same nosological category (APA, 1968). However, in the 1970s and 1980s, the necessity to differentiate autism from schizophrenia was suggested as research showed discrepancies between them in several aspects such as age of onset, distribution of gender and long-term outcomes (Cantor, Evans, Pearce, & Pezzot-Pearce, 1982; Kolvin, 1971; Rutter, 1972; Volkmar & Cohen, 1991; Watkins, Asarnow, & Tanguay, 1988; Werry, 1992). Since then, schizophrenia and autism have been considered as separate but similar disorders.

Abbreviations: ASD, autism spectrum disorders; SSD, schizophrenia spectrum disorders; HFA, high functioning autism; HFA-PS, high functioning autism with psychotic symptoms; UD, unique design (response unit for the non-verbal fluency test).

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Nevertheless, recent research findings from various scientific domains suggest that autism spectrum disorders (ASD) and schizophrenia spectrum disorders (SSD) share some common features at the biological (see Burbach & van der Zwaag, 2009 for review), psychosocial and cognitive level (Baron-Cohen, Leslie, & Frith, 1985; Bölte, Rudolf, & Poustka, 2002; Couture et al., 2010; Eack et al., 2013; Hill, 2004; Ozonoff et al., 1994; Pilowsky, Yirmiya, Arbelle, & Mozes, 2000; Pinkham, Hopfinger, Pelphrey, Piven, & Penn, 2008; Poletti & Adenzato, 2013; Sasson, Tsuchiya, Hurley, Shannon, & Penn, 2007; Sugranyes, Kyriakopoulos, Corrigall, Taylor, & Frangou, 2011). Over the last few years, many studies have reported a similar overlap in clinical symptoms, either identifying schizophrenic-like symptoms in people with ASD (Gadow & DeVincent, 2012; Spek & Wouters, 2010), or revealing elements of ASD in people with schizophrenia (Unenge Hallerbäck, Lugnegård, & Gillberg, 2012).

All these findings reveal well-known nosological and characterisation issues relative to both these neurodevelopmental disorders. Our study aims to focus on these issues regarding cognitive profiles and cognitive impairments in those disorders (see Cochran, Dvir, & Frazier, 2013 for review).

We chose to focus on individuals with high functioning autism (HFA) because of the specific difficulties linked to differential diagnosis between people with ASD or SSD with regard to normal intelligence. In particular, we sought to investigate the extent to which neuropsychological and neurocognitive components could be specific in people with HFA who later developed psychotic symptoms.

Goldstein, Minshew, Allen, and Seaton (2002) reported that individuals with HFA have a cognitive profile that resembles that of an empirically derived subgroup of patients with schizophrenia; but do not have a cognitive profile similar to the one that the majority of people with schizophrenia have. Based on this observation, we attempted to compare the impaired and preserved cognitive functions for each disorder and to focus on functions known to be preserved in HFA but impaired in schizophrenia.

It is widely accepted that the cognitive profile is broadly impaired in schizophrenia, displaying problems in all executive components, but also in memory, processing speed, semantic memory, verbal and non-verbal fluency and so on (see Schaefer, Giangrande, Weinberger, & Dickinson, 2013 for review). On the contrary, individuals with HFA display more moderate cognitive impairments. Although very few studies specifically address high functioning autism, some have already reported difficulties with regard to attentional shifting (Allen & Courchesne, 2001; Stauder, Bosch, & Nuij, 2011) but have shown preserved performances for sustained attention (Johnson et al., 2007; Kenworthy et al., 2005). Memory also seems to be impaired particularly in interference conditions (Gras-Vincendon, Bursztejn, & Danion, 2008; Lind & Bowler, 2010) and for the recall of autobiographical memories (Crane & Goddard, 2007). More diversified impairments have been found with regard to cognitive flexibility (Bogte, Flammaa, Van der Meereb, & Van Engeland, 2008; Geurts, Corbett, & Solomon, 2009; Kaland, Smith, & Mortensen, 2008; Ozonoff, Pennington, & Rogers, 1991), planning (Ozonoff et al., 1991) or verbal fluency (Begeer et al., 2013; Boucher, 1988; Inokuchi & Kamio, 2013; Kleinhans, Akshoomoff, & Delis, 2005; Spek, Schatorjé, Scholte, & van Berckelaer-Onnes, 2009) in these individuals. However, in ASD as in HFA, simple inhibition is consistently reported as preserved (Bishop & Norbury, 2005; Bogte et al., 2008; Brian, Tipper, Weaver, & Bryson, 2003; Hill, 2004; Kana, Keller, Minshew, & Just, 2007; Kleinhans et al., 2005; Ozonoff & Strayer, 1997; Raymaekers, Van der Meere, & Roeyers, 2006; Sachse et al., 2013; Schmitz et al., 2006). Besides, Barneveld, De Sonneville, Van Rijn, Van Engeland, & Swaab (2013) stress that, in adolescents with HFA, response inhibition could be an executive component that is specifically associated with the presence of schizotypal symptoms.

Based on these data, we have focused on three main areas in order to identify the cognitive correlates of people with schizophrenia as well as people with high functioning autism: verbal fluency, simple inhibition and non-verbal fluency. Inhibition and non-verbal fluency were selected owing to their theoretical preservation in HFA and alteration in people with schizophrenia. Verbal fluency was selected for its special features not only in schizophrenia, namely, the fact that impairments on specified tasks are found in patients, but also in individuals at high risk of psychosis, siblings and controls with a high score of schizotypal personality (Barrantes-Vidal et al., 2003; Becker et al., 2010; Cochrane, Petch, & Pickering, 2012; Kiang & Kutas, 2006; Pukrop and Klosterkötter, 2010; Scala et al., 2013; Schultze-Lutter et al., 2007; Snitz, Macdonald, & Carter, 2006); consequently, they could represent a marker for the endophenotype of schizophrenia.

Those tasks had therefore been chosen because of their theoretical preservation in HFA while many studies report impairments for it in schizophrenia. By doing so, we aim to focus both on analysing the neurocognitive characteristics of psychotic symptoms in HFA (HFA-PS) but also trying to know whether psychotic negative symptoms could have been mistaken for autistic traits during childhood. If it is the case, we expect to see impairments for the HFA-PS group participants for all the neurocognitive measures as they are known to be impaired in schizophrenia.

2. Materials and methods

2.1. Participants

Participants were divided into two groups (Table 1). The first group comprised well-diagnosed young adults with HFA ($n = 9$) defined as having a full IQ scale of 71 or higher (based on the French version of the WAIS-III; Weschler, 2000). The HFA diagnostic was carried out by a well-known neuropsychiatrist from a medical centre specialised in ASD based on the DSM-IV criteria. The second group, the HFA-PS group (High Functioning Autism with Psychotic Symptoms), was composed of young adults ($n = 8$) who had initially been diagnosed with HFA during childhood and later developed psychotic first rank