



Confirmatory factor analysis of the Adult Asperger Assessment: The association of symptom domains within a clinical population

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ABSTRACT

Autism Spectrum Disorder (ASD) is a behaviourally defined disorder characterised by impairments in three domains of social interaction, communication, and repetitive, stereotyped behaviours and activities. Proposed changes to diagnostic criteria suggest that the diagnostic triad may no longer fit as the best way to conceptualise ASD, and that social and communication impairments should be considered as a single domain. The aim of this study was to examine the structure of symptom domains within the *Adult Asperger Assessment* (AAA; Baron-Cohen, Wheelwright, Robinson, & Woodbury-Smith, 2005), a diagnostic tool for high functioning adults. As theoretical models already exist, confirmatory factor analysis was used to examine data from a clinical population of adults ($n = 153$) diagnosed with Asperger Syndrome (AS) and High Functioning Autism (HFA). Confirmatory factor analysis was used to fit different models based on the structure proposed by the authors of the AAA, the traditional triad and the newly proposed diagnostic dyad. Analysis suggested that none of the tested models were a good fit on the AAA dataset. However, it did highlight very high correlations between social and communication factors ($r > 0.9$) within unmodified models. The results of the analysis provide tentative support for the move towards considering ASD as a dyad of 'social-communication' impairments and repetitive/restricted interests behaviours and activities, rather than the traditional triad.

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1. Introduction

Autism Spectrum Disorders (ASD; also known as Pervasive Developmental Disorders [PDD]) are characterized by impairments in the three domains of social interaction, communication, and repetitive/restricted interests, behaviours and activities (RIBA) in current diagnostic manuals (DSM-IV-TR; American Psychiatric Association [APA], 2000; ICD-10; World Health Organisation [WHO], 1992). In line with most other psychiatric diagnoses, ASD has traditionally been conceptualised as a discrete category, but a consensus is emerging that it is in fact a dimensional disorder reflecting developmental difficulties at the extreme end of a continuum (Mandy & Skuse, 2008). Evidence for this dimensionality has been provided by the broader autistic phenotype in siblings of those with ASD (e.g. Piven, Jacobi, Childress, & Arndt, 1997) and by studies showing that ASD traits are continuously distributed in large general population studies (Constantino & Todd, 2003; Posserud, Lundervold, & Gillberg, 2006). However, the nature of the dimensionality of ASD, and particularly the association between the three domains of impairment, continues to elicit debate.

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Although not due for publication until 2013, the fifth edition of the diagnostic and statistical manual (DSM-V) acknowledges the questions surrounding the association of symptom domains as it proposes ASD move to 'Autistic Disorder' (APA, 2010). The three symptom domains are merged into two: 'social–communication' deficits as a single domain, and fixated interests and repetitive behaviours (or RIBA) as a second. It also proposes that Asperger Syndrome (AS) be subsumed into Autistic Disorder (APA, 2010). Thus, diagnostic criteria for AS would rely on this proposed 'dyad' of domains. Currently, boundaries between the subtypes of ASD remain unclear (in particular autism, High Functioning Autism [HFA], AS and Pervasive Developmental Disorder – Not Otherwise Specified [PDD-NOS]). Most researchers consider them as a continuum of the same disorder, with varying degrees of symptom severity and intellectual functioning (Freitag, 2007). They are currently conceptualised to share the triad of impairments, although for a diagnosis of AS, no impairment in communication or language delay is evident. Confusion arises around communication difficulties and AS, as authors have highlighted clinical difficulties in prosody (Paul, Augustyn, Klin, & Volkmar, 2005) and pragmatic impairments (Baron-Cohen, O'Riordan, Stone, Jones, & Plaisted, 1999; Landa & Goldberg, 2005). These are not currently required for diagnosis, and are not stated in DSM-V.

The proposed changes to diagnostic criteria for Autistic Disorder suggest a change in the structure associated with ASD. The traditional triad of impairments becomes a dyad, with social and communication impairments being considered as a single domain. Historically, in line with other psychiatric diagnoses, ASD has been considered a 'disease entity' (Rutter, 1978). Within this framework, the symptoms of social impairments, communication impairments and RIBA are presumed to be associated, as they would arise from the shared underlying abnormality (Mandy & Skuse, 2008). The move away from ASD as a discrete category towards a dimensional conceptualisation has reignited debate about the nature of the association between domains of impairment. Although currently all three domains are required for a diagnosis to be made, the association between them remains unclear.

One method authors have used to consider the association between symptoms and the structure of autism is by using factor analysis. Factor analytic techniques are used to pull out underlying structures (known as factors or components) by identifying which items co-vary (Kline, 1994). As such, factor analysis can examine whether or not the social, communication and RIBA domains of ASD co-vary and correlate. If they do, they should not show up as different factors, as individuals who score highly on social items would be expected to score highly on communication and RIBA items, and vice versa. However if they are not correlated, analysis should result in distinct factors. A recent review of the literature (Kuenssberg, McKenzie, & Jones, 2011) highlighted that despite three decades of exploration there is still no clear answer about the triad's empirical relevance. The majority of analyses resulted in authors recommending a move towards conceptualising social deficits and communication deficits as being a shared social–communication factor, in line with proposed DSM-V amendments (e.g. Frazier, Youngstrom, Kubu, Sinclair, & Rezai, 2008; Georgiades et al., 2007; Kamp-Becker, Ghahreman, Smidt, & Remschmidt, 2009; Snow, Lecavalier, & Houts, 2009; van Lang et al., 2006).

Despite ongoing debate about the structure of ASD, awareness has grown exponentially after Rutter's influential review and generation of the 'Rutter criteria' (Rutter, 1978), and the subsequent publication of the DSM-III in 1980 (APA, 1980). Professionals are now alert and informed of the possibility of children with ASD, and as a result there are a growing number of tools targeted for assessment and diagnosis. Currently, the 'gold standard' for assessment in childhood is the *Autism Diagnosis Interview-Revised* (ADI-R; Lord, Rutter, & Le Couteur, 1994) and the *Autism Diagnostic Observation Schedule – Generic* (ADOS-G; Lord et al., 2000). However, these tools are time consuming to administer, complex, and require expensive training. They are also not age-appropriate for adults born before the ASD watershed of the 1980s (Baron-Cohen, Wheelwright, Robinson, & Woodbury-Smith, 2005). Diagnosis of autism and AS in adulthood can be difficult, as they share many symptoms with other DSM-IV-TR disorders, such as social anxiety disorder, obsessive–compulsive disorder, and schizoaffective disorder (Baron-Cohen & Wheelwright, 2004; Fitzgerald & Corvin, 2001).

One tool designed to diagnose AS in adults is the *Adult Asperger Assessment* (AAA; Baron-Cohen et al., 2005). This links two self-report screening instruments, the *Autism-Spectrum Quotient* (AQ; Baron-Cohen, Wheelwright, Skinner, Martin, & Clubley, 2001) and the *Empathy Quotient* (EQ; Baron-Cohen & Wheelwright, 2004). The client's response to each item on the AQ and EQ is entered into the AAA spreadsheet, and a macro is run to score the client's response into one of four sections of the AAA; (i) qualitative impairments in social skills (Social); (ii) restricted repetitive and stereotyped patterns of behaviour, interest and activities (RIBA); (iii) qualitative impairments in verbal or nonverbal communication (Comm); and (iv) impairments in imagination (Imag). The AQ and EQ responses form two functions; all the completed items are used to provide an overall score which can be compared to clinical cut-offs (Baron-Cohen et al., 2005), but 72 of the AQ and EQ items are also used as examples of impairment within each section of the AAA (see Table 1, as described in the example AAA in Baron-Cohen et al., 2005). This can then be used as the basis of a qualitative interview, and directly compared to DSM-IV criteria.

For a diagnosis of AS or HFA, individuals need to display symptoms in each of the four sections detailed above. The AAA had been designed to be more stringent than DSM-IV criteria, so anyone who meets the AAA criteria will also meet DSM-IV criteria (Baron-Cohen et al., 2005). Differential diagnosis between AS and HFA depends on the absence or presence of developmental language delay respectively. The AAA includes six items relating to imagination, although the authors acknowledge debate over imagination deficits in AS, and indeed within ASD. Imaginative behaviours include activities ranging from simple pretend play to creative engagement with fictional stories. There is some debate over whether or not the concept of impaired imagination is linked to repetitive behaviour (as described by Wing & Gould, 1979) or communication impairments, as described within classification systems (within the lack of spontaneous make-believe play: APA, 2000). As

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