

**Self-understanding in high-functioning males with
autism spectrum disorders: Relationship with
social functioning and theory of mind**

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Preface

All of the work described in this thesis was carried out personally by the author under the auspices of the Centre for Behavioural Sciences, Department of Medicine, Faculty of Medicine, The University of Sydney. None of the work has been submitted previously for the purpose of obtaining any other degrees.

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Abbreviations

ASD	Autism spectrum disorders
AD	Asperger's disorder
ADI-R	Autism Diagnostic Interview - Revised
CBCL	Child Behavior Checklist
DSM-IV-TR	Diagnostic Statistical Manual- Fourth Edition Text Revision
HFA	High-functioning autism
ID	Intellectual disability
ICD-10	International Classification of Diseases - Tenth Edition
KBIT	Kaufman Brief Intelligence Test
PDD-NOS	Pervasive Developmental Disorder- Not Otherwise Specified
PPVT-III	Peabody Picture Vocabulary Test – Third Edition
TD	Typically developing
ToM	Theory of mind
VABS	Vineland Adaptive Behavior Scales

Abstract

Aim. This study aims to investigate self-understanding in young males with high-functioning autism spectrum disorders (ASD) and to determine whether self-understanding is related to social functioning and theory of mind (ToM). In addition, this study aims to examine the characteristics and abilities of young males with high-functioning autism (HFA) and Asperger's disorder (AD) to determine whether there are significant differences in self-understanding and whether self-understanding is related to social functioning and ToM between these two groups. The results have important implications for social skills interventions for young people with ASD.

Method. Forty three young males diagnosed with one of the ASD (25 diagnosed with HFA and 18 diagnosed with AD) were compared with 38 TD males. Participants were assessed using the Autism Diagnostic Interview-Revised (ADI-R), the Kaufman Brief Intelligence Test (KBIT), the Vineland Adaptive Behavior Scales (VABS), the Peabody Picture Vocabulary Test-Third Edition (PPVT-III), Damon and Hart's Self-understanding Interview, and two false-belief ToM tasks.

Results. Children with ASD had difficulties recognising and attributing their own mental states and failed to integrate various aspects of the self.

Specifically, the ASD group produced fewer self-statements that reflected agency (the awareness and understanding that one is in control of their actions), social aspects of self (such as personality characteristics and group membership) and psychological aspects of self (such as emotions, thoughts and cognitive processes). Instead, children with ASD produced more concrete physical self-statements (such as body characteristics and material possessions). A significant positive relationship was found between self-understanding and social functioning for the ASD group. Within the ASD group, the relationship held for the HFA group only. In terms of ToM, children with ASD were less able to correctly answer the second-order false-belief ToM question compared to the TD group. For the ASD group, there was a significant positive correlation between self-understanding and ToM. Within the ASD group, the relationship held for the HFA group only.

Conclusions. The results show young males with high-functioning ASD are less aware of their own and others' mental states perhaps reflecting a general delay in the development of self-understanding and ToM. Furthermore, a more developed self-understanding may translate to improved social functioning and ToM ability for young males with high-functioning ASD. For young males with HFA, self-understanding and ToM may stem from a common underlying cognitive framework. Consequently, treatments aimed at improving self-understanding may simultaneously improve ToM, or vice

versa. For individuals with AD there may be a separate cognitive mechanism responsible for self-understanding and another for ToM. Therefore, different interventions may be required; one to improve self-understanding and another to improve the understanding of others' minds. Overall, these results may assist in the development of practice parameters for social skills training for those with ASD.

Chapter 1

Introduction

The present study aims to systematically investigate self-understanding in young males with high-functioning autism spectrum disorders (ASD) and determine whether self-understanding is related to theory of mind (ToM). In addition, this study aims to examine the characteristics and abilities of young males with high-functioning autism (HFA) and Asperger's disorder (AD) to determine whether there are significant differences in self-understanding and ToM between these two groups.

ASD are lifelong developmental disorders that affect the way a person communicates and relates to other people and the world around them. People affected by ASD typically display major impairments in social interaction, verbal and non-verbal communication and restricted, repetitive and stereotyped patterns of behaviour, interests and activities. The term ASD is an umbrella description which includes autistic disorder, Asperger's disorder and Pervasive Developmental Disorder-Not Otherwise Specified (PDD-NOS) including atypical autism as specified in the *American Psychiatric Association's Diagnostic and Statistical Manual of Mental Disorders Fourth Edition-Text Revision (DSM-IV-TR)* (American Psychiatric Association, 2000).

When Kanner (1943) first described autism, he recognised that individuals with this condition could be high-functioning in terms of their language and intellectual skills. Since Kanner's original account, researchers and clinicians have discovered that individuals with high-functioning autism (HFA) have different needs and behaviours compared with more typical children with autism (Everard, 1976; Levy, 1986). The term HFA is commonly applied to those individuals who meet diagnostic criteria for autistic disorder (as per *DSM-IV-TR*) and whose full scale intelligence quotient (IQ) is 70 or above (Tsai, 1992).

AD is defined by qualitative impairments in social interaction and restricted repetitive and stereotyped patterns of behaviour, interests, and activities. In contrast with the definition for HFA the criteria for AD states there is no evidence of clinically significant language delay (American Psychiatric Association, 2000). Current criteria for AD also state that there be no delay in: cognitive development, the development of age appropriate self-help skills, adaptive behaviour (other than social interaction), and curiosity about the environment in childhood (American Psychiatric Association, 2000).

The validity of AD as a distinct diagnostic entity from HFA has generated considerable debate and remains controversial. Numerous studies have been conducted in which direct comparisons have been made between

individuals diagnosed with HFA and AD. Most of this research, however, is limited by a lack of consistent diagnostic criteria making the results very difficult to interpret and compare across studies (Macintosh & Dissanayake, 2004). The present study adopted strict operational definitions for HFA and AD and applied these to the realm of self-understanding and ToM. The results will add to the growing body of research on the similarities and differences between HFA and AD and will assist in determining whether the two conditions are separate diagnostic entities that can be reliably differentiated.

The deficit in reciprocal social interaction is a core feature of ASD and improvements in social functioning have been identified as one of the most critical areas needing remediation. A thorough understanding of the social difficulties experienced by young people with ASD is required to enable interventions to specifically treat the social deficits. It has been hypothesised that a restricted understanding of self contributes to the social difficulties experienced by young people with ASD. However, there are only a few studies located on how young people with ASD conceptualise themselves and there were no studies located on how self-understanding relates to their social functioning.

Self-understanding is a multifaceted construct comprising several dimensions that define a person's view of his or her "personhood" or individuality. Damon and Hart's model of self-understanding (1982; 1988) provides a comprehensive framework for studying both the structural organisation and developmental changes along multiple, interacting dimensions of the self concept.

Hobson (1990) claims that children with autism lack the prerequisites for self-understanding and thus fail to develop an "interpersonal self". He suggests that children with autism fail to see themselves as subjects of experience and lack the capacity to think of themselves as thinkers.

There have only been a few studies located on self-understanding in ASD, and most of these studies have focused on low functioning children. There has been one study on high-functioning children with ASD, however, strict diagnostic criteria was not applied. The present study, applied strict operational definitions for HFA and AD to address the issue of how young people with high-functioning ASD understand themselves.

Another explanation for the social impairments experienced by young people with ASD is the difficulty in understanding the psychological states of others which is also known as ToM (Premack & Woodruff, 1978). This ability

appears to be a prerequisite for normal social interaction, communication, (Bloom, 1998; Frith & Happe, 1994,1999) and educational success (Astington, 1988).

Dennett (1978) proposed that the “acid test” of whether a child has ToM arises in situations involving false-belief; the understanding that others hold a belief whose content contradicts reality. The ability to attribute false-beliefs to others is considered a particularly important milestone in the development of ToM.

An increasing number of studies have shown that children with ASD have particular difficulties in reasoning about mental states. Furthermore, it has been proposed that the deficit in ToM underlies the social impairments and many of the other developmental abnormalities characteristic of ASD.

Hobson (1982) proposed an order in which children come to understand the social world. He suggested that self-understanding (or self-knowledge) is critical and underlies the ability to understand the mental states of others. Hobson claimed that because children with autism lack a sense of “themselves” as potential objects of other people’s evaluations they fail to develop ToM. However, there is little research relating to self-understanding and ToM. The question of how children’s developing self provides the

infrastructure for ToM has not been addressed in young people with high-functioning ASD. The present study will investigate the relationship between self-understanding and ToM in young males with high-functioning ASD. For young males with ASD self-understanding and ToM may be related and stem from a common underlying cognitive framework. That is, detecting one's own attitudes may engage the same cognitive mechanism as detecting other people's mental states (Frith & Happe, 1999; Gopnik & Meltzoff, 1994). Consequently, social skills interventions aimed at improving self-understanding may simultaneously improve ToM, or vice versa. This will be the first study to investigate the relationship between self-understanding and ToM in young people with high-functioning ASD.

Chapter 2

Autism Spectrum Disorders

2.1 Introduction

Autism spectrum disorders (ASD) are lifelong developmental disorders that affect the way a person communicates and relates to other people and the world around them. People affected by ASD typically display major impairments in social interaction, verbal and non-verbal communication and restricted, repetitive and stereotyped patterns of behaviour, interests and activities. The term ASD is an umbrella description which includes autistic disorder, Asperger's disorder (AD) and Pervasive Developmental Disorder-Not Otherwise Specified (PDD-NOS) including atypical autism as specified in the *American Psychiatric Association's Diagnostic and Statistical Manual of Mental Disorders Fourth Edition-Text Revision (DSM-IV-TR)* (American Psychiatric Association, 2000). Kanner (1943) originally identified the syndrome of early infantile autism. In the year after Kanner's first description of autism, Asperger (1944/1991) published his findings on a similar condition which he called autistic psychopathologies in children. Since Kanner's and Asperger's original descriptions a vast amount of work has attempted to understand these conditions.

2.2 A spectrum of autism disorders

The concept of a continuum of autism was first discussed in 1979 (Wing & Gould, 1979), and in 1988, the terms “autism spectrum disorder” and “autistic continuum” were introduced (Allen, 1988). Wing used the term ASD to refer to a broad group of conditions sharing the “triad of impairments” in social interaction, verbal and non-verbal communication and imagination, which implied a continuum of disturbance in each of the three domains (Wing, 1997). For Wing, these conditions included pervasive developmental disorders, but also disorders of empathy, attention, motor control and perception.

The term ASD is now commonly used to describe the spectrum of behavioural phenotype and severity that is part of the continuum from “normal” to “disordered” development in reciprocal social interactions, verbal and non-verbal communication and restricted, repetitive and stereotyped patterns of behaviour, interests and activities (Wray, Silove, & Knott, 2005). ASD are generally accepted to include autistic disorder (also known as infantile autism or childhood autism), AD and PDD-NOS (including atypical autism) as specified in the *DSM-IV-TR* (American Psychiatric Association, 2000). These diagnoses are classified under “pervasive developmental disorders” because currently the term ASD does not appear in the *DSM-IV-TR* (American Psychiatric Association, 2000).

The behavioural characteristics presented in individuals with ASD are considered to be the result of neurological differences of organic cause and point to multiple interrelated factors (Howlin, 1999). For example, autistic disorder is recognised as a possible endpoint of several organic diseases, including fragile X, tuberous sclerosis, congenital rubella, phenylketonuria and postnatal encephalitis. Twin studies have consistently documented a strong genetic component in the aetiology of ASD with evidence suggesting that several genes contribute to the underlying genetic risk of developing autistic disorder; with possibly more than 10 genes involved (Wray et al., 2005).

2.3 Epidemiology of autism spectrum disorders

2.3.1 The prevalence of autism spectrum disorders

Prevalence data reflect the proportion of individuals in a population who suffer from a defined disorder at a particular point in time and is useful to estimate needs and to plan services. According to the (British) Medical Research Council's *Review of Autism Research* (Medical Research Council, 2001) prevalence estimates depend on exact assessment tools and ascertainment methods, and variations across studies can reflect such methodological differences.

Until recently, autism has been considered a rare disorder with an estimated prevalence of approximately four per 10,000 children (Prior, 2003). Currently, there appears to be fairly good agreement that ASD affect approximately 60 per 10,000 children under eight years (Medical Research Council, 2001). A recent American prevalence study estimates one in 150 eight year old children have one of the ASD (Centers for Disease Control and Prevention, 2007). Similarly, a recent Australian prevalence study estimates one in 160 children between six and 12 years have one of the ASD (MacDermont, Williams, Ridley, Glasson, & Wray, 2007). Any perceived increase in prevalence may be owing to increased awareness of ASD, changes in diagnostic criteria, more sophisticated screening and diagnostic assessment tools, and possibly environmental factors that may trigger a genetic predisposition (Wray et al., 2005).

2.3.2 The incidence of autism spectrum disorders

In contrast to prevalence, incidence measures the number of new cases of a condition occurring in the population over a specified period of time. According to a recent study on the incidence of ASD in Australian children, a large number of children were newly identified with ASD in two Australian states, New South Wales (NSW) and Western Australia (WA), between 1999 and 2000 (Williams et al., 2005). In WA, 252 children aged 0-14 years were identified with ASD (169 with autistic disorder and 83 with AD or PDD-NOS),

while in NSW there was 532 (400 with autistic disorder and 132 with AD or PDD-NOS) (Williams et al., 2005). According to the authors, these figures are similar to rates reported in the United Kingdom.

Fombonne (2005) argues that the available epidemiological evidence does not strongly support the hypothesis that the incidence of autism has increased. He claims that recent increases in prevalence rates cannot be directly attributed to an increase in the incidence of the disorder. Changes in diagnostic criteria, diagnostic substitution, changes in the policies for special education and the increasing availability of services are more likely to be responsible for higher prevalence rates.

2.4 A brief historical account of autism

2.4.1 Kanner's original description

Leo Kanner (1894–1981) was an Austrian-American psychiatrist and physician who had a special interest in child psychiatry. His seminal 1943 paper 'Autistic Disturbances of Affective Contact' described eleven children who presented from the age of two years and sharing "unique" and previously unreported patterns of behaviour. These children were observed to have had poor relations with people, delays in language, abnormal patterns of speech, repetitive behaviour and obsessive preoccupations. He named this pattern of clinical features 'early infantile autism'.

For Kanner, the core characteristic of early infantile autism was a profound lack of affective contact with other people. Kanner claimed that these children at a young age appeared to be aloof and different to other children. He wrote, "there is, from the start an extreme autistic aloneness that, wherever possible, disregards, ignores, shuts out anything that comes to the child from outside" (Kanner, 1943). Specific features of the social impairment included poor or total avoidance of eye contact, few if any communicative gestures, inadequate imitative ability, and the overriding preference to be apart from other people.

In contrast to their poor relation with people, Kanner (1943) noted how these children tended to have a good relation with objects. He observed that the children become intensely attached to specific objects or collections of similar objects and showed resistance to interference with their possessions. Kanner observed that these objects were only used for repetitive activities such as spinning them or arranging them in straight lines. Kanner also noted an anxiously obsessive desire for the maintenance of sameness. This was evidenced in the children's repetitiveness and rigidity which was associated with resistance to change in daily routine or in repetitive activities.

Another core characteristic of early infantile autism was a kind of language that did not seem intended to serve interpersonal communication. Kanner noted a characteristically abnormal pattern of speech in those children who came to acquire language. Kanner (1943) reported that children with early infantile autism were generally delayed in spontaneously putting two or more words together. According to Kanner (1943) some of these children could form sentences, but used parrot-like repetitions of what they had heard. Sometimes their repetitions were echoes of what they had immediately heard (immediate echolalia) whilst other times they were stored word combinations (delayed echolalia). Additionally, spontaneous words tended to have meanings that were rigid or inflexible, and personal pronouns were repeated as heard, so the children would refer to themselves as "you" and to others as

“I”. The overall impression was that language was not employed as a tool to communicate with others.

Kanner (1943) described additional clinical features, but did not consider these features as essential criteria for early infantile autism. Some of these additional features included odd responses to sensory stimuli, stereotyped movements of limbs and body and aggressive behaviours. Kanner commented on the cognitive profiles of these children. He noted that “good cognitive potential manifested in those who could speak, by feats of memory or, in the mute children, by their skill on performance tests” (Kanner, 1943).

2.4.2 Current diagnostic criteria for autistic disorder

Since Kanner’s original report, clinical observation and research has led to two major diagnostic classifications of this pervasive developmental disorder: childhood autism as detailed in the World Health Organization’s *International Classification of Disease* (World Health Organization, 1992a) and autistic disorder in the *DSM-IV-TR* (American Psychiatric Association, 2000). These two systems agree on the definition of autism, partly as a result of the *DSM-IV-TR* autism and pervasive developmental disorders field trial (Boelte & Poustka, 2000). In addition they have a fundamental continuity with the original description of autism made by Kanner (1943). The key elements in

these conceptually equivalent definitions include a triad of abnormal functioning in each of the following three domains:

- qualitative impairment in reciprocal social interaction;
- qualitative impairment in communication; and
- restricted, repetitive and stereotyped patterns of behaviour, interests, and activities.

For a diagnosis of autistic disorder, a person must meet a specified number of symptoms within each domain. In addition they must have a delay or abnormal functioning in one of the following areas, with onset prior to age three years:

- social interaction;
- language as used in social communication; and
- symbolic or imaginative play.

Further, the disturbance should not be better accounted for by Rett's Disorder or Childhood Disintegrative Disorder (American Psychiatric Association, 2000).

The *DSM-IV-TR* (American Psychiatric Association, 2000) criteria for the identification of qualitative impairment in social interaction, to which much of

this thesis is devoted, involves identifying at least two of the following features:

- a) Marked impairment in the use of multiple non-verbal behaviours such as eye-to-eye gaze, facial expression, body postures, and gestures to regulate social interaction;
- b) Failure to develop peer relationships appropriate to developmental level;
- c) Lack of spontaneous seeking to share enjoyment, interests, or achievements with other people (for example, by a lack of showing, bringing, or pointing out objects of interest); and
- d) Lack of social or emotional reciprocity.

2.4.3 High-functioning autism

When Kanner (1943) first described autism, he recognised that individuals with this condition could be high-functioning in terms of their language and intellectual skills. In fact, because the 11 children in Kanner's original sample were above average intelligence, he believed that all children with autism were within the normal range of intelligence. Since Kanner's original account, researchers and clinicians have discovered that individuals with HFA have different needs and behaviours compared with most children with autism (Everard, 1976; Levy, 1986) and have called for clearer diagnostic criteria (Tsai, 1992).

At the present time, however, there is no explicit definition for HFA. The *ICD-10* (World Health Organization, 1992a) and *DSM-IV-TR* (American Psychiatric Association, 2000) classifications have not yet established diagnostic criteria. Despite this, there is a general consensus in the field of autism as to the features of HFA. The term HFA is commonly applied to those individuals who meet diagnostic criteria for autistic disorder (as per *DSM-IV-TR*) and whose cognitive level (generally full scale intelligence quotient (IQ)) is 70 or above as determined by a valid and individually administered IQ test (Tsai, 1992).

The study of HFA is important because it allows comparison with non-autistic age-matched controls which offers an opportunity for testing the hypothesis that autism occurs without cognitive deficits. Research systematically comparing high-functioning and low-functioning children with autism, offers an opportunity to test the validity of sub-typing autism, based on cognitive levels and establishes cognitive and behavioural profiles. More recent debates centre on the distinction of HFA from AD. The next section of this chapter will concentrate on describing AD before concluding with a review of the similarities and differences between HFA and AD.

2.5 A brief historical account of Asperger's disorder

2.5.1 Asperger's original description

Hans Asperger (1906-1980) was an Austrian paediatrician who had a special interest in the integration of psychiatry and remedial education (Klin & Volkmar, 1997). In the year after Kanner's (1943) first description of autism, Hans Asperger (1944/1991) published his findings on a condition he called "autistischen Psychopathen in Kindesalter" or autistic psychopathologies in children. Asperger chose the label Autistic Psychopathy to signify extreme egocentrism or shutting off from others. Asperger and Kanner were unaware of each other's work, but their description of their patients shared many commonalities. These included marked impairments in social interaction and restricted, repetitive and stereotyped patterns of behaviour, interests and activities.

In his original paper, Asperger (1944/1991) described the case histories of four children, aged six to 11 years, who presented with marked difficulties in social integration despite seemingly adequate cognitive and verbal skills (Frith, 1991). Asperger (1944/1991) described many facets of the behaviour of children with his syndrome, but did not give a list of essential criteria. However, he emphasised the children were:

- 1) Socially odd, naïve, inappropriate and emotionally detached from others;

- 2) Markedly egocentric and highly sensitive to any perceived criticism, while being oblivious of other people's feelings;
- 3) Possessed of good grammar and extensive vocabularies;
- 4) Fluent in speech, but long-winded, literal and pedantic, using monologues and not engaging in reciprocal conversations;
- 5) Demonstrating poor non-verbal communication and monotonous or peculiar vocal intonation; and
- 6) Showing circumscribed interests in specific subjects, including collecting objects or facts connected with these interests (Asperger, 1944/1991).

Asperger (1944/1991) indicated that although most of the affected children had intelligence in the borderline, normal to superior range, they had difficulty in learning conventional schoolwork, and he believed these children conspicuously lacked commonsense. However he noted, that these children were capable of producing remarkably original ideas and had skills connected with their special interests. While he described their motor coordination and organisation of movement as generally poor, some performed well in their areas of special interest, such as playing a musical instrument. Asperger also noted that the condition could not be recognised in infancy or usually before the third year of life (Asperger, 1944/1991).

Asperger's original work was written in German and was not widely known in English psychiatric literature until a review and series of case reports by Lorna Wing in 1981 (Wing, 1981). Wing reported 34 cases (aged five to 34 years) of whom 19 had a clinical presentation similar to Asperger's original account. The other 15 presented consistent with current diagnostic criteria, but did not have the characteristic onset patterns and early history. Concerned that the term *autistic psychopathy* might be associated with sociopathic behaviour, Wing (1981) proposed the label Asperger's syndrome and based on her own case histories, made some modifications to Asperger's original account.

Wing's account generated interest and many case reports and research studies followed. There was considerable variability, however, in the use of the label among clinicians and researchers (Gillberg, 1989; Szatmari, Bremner, & Nagy, 1989; Tantam, 1988) which made comparisons among studies difficult. This led to a need for a consensus in diagnostic criteria.

2.5.2 Current diagnostic criteria for Asperger's disorder

In 1994, AD was included in the *DSM-IV* for the first time (American Psychiatric Association, 1994) the criteria for the qualitative impairments in social interaction, and restrictive and repetitive patterns of behaviours and activities being identical to those for autistic disorder. In the most recent

edition of the *DSM-IV-TR* (American Psychiatric Association, 2000), AD is defined by qualitative impairment in social interaction and restricted repetitive and stereotyped patterns of behaviour, interests, and activities.

In contrast to the criteria for autistic disorder which includes deficits in verbal and nonverbal communication and play, the criteria for AD states that there is no evidence of clinically significant language delay, such that the child used single words by age two years, and communicative phrases by age three years (American Psychiatric Association, 2000). Current criteria also state that there is no delay in cognitive development (that is, normal or near normal IQ), the development of age-appropriate self-help skills, adaptive behaviour (other than social interaction), curiosity about the environment in childhood and criteria are not met for another specific Pervasive Developmental Disorder or Schizophrenia (American Psychiatric Association, 2000).

As there is no clinically significant language delay in AD, this contributes to the late clinical recognition compared with other ASD, which may be related to normal or near-normal adaptive behaviour in the early years of life (Volkmar & Cohen, 1991). However, language in AD is clearly not typical or normal. Individuals with AD usually have pedantic and poorly modulated speech and poor nonverbal pragmatic communication skills (Filipek et al., 1999)

2.6 Similarities and differences between high-functioning autism and Asperger's disorder

2.6.1 Introduction

The validity of AD as a distinct diagnostic entity from HFA has generated considerable debate and remains controversial (Gillberg & Ehlers, 1998; Macintosh & Dissanayake, 2004; Rutter & Schopler, 1992). The *ICD-10* (World Health Organization, 1992a) specifically noted this issue in the description of Asperger's syndrome. There is little disagreement that AD is on a phenomenological continuum with autism (Wing, 1991); however, it is unclear whether AD will remain a valid syndrome separate from autism (Gillberg & Ehlers, 1998; Rutter & Schopler, 1992).

Macintosh and Dissanayake (2004) outlined several reasons why it is important to determine whether AD is distinct from HFA. Firstly, if individuals with AD have qualitatively different impairments from those with HFA, then they are likely to have different intervention needs. Alternatively, if symptoms are similar, then individuals with AD may benefit from the wealth of knowledge acquired about management of HFA. Secondly, if the two conditions are distinct, they may vary in terms of aetiology. This knowledge may enable early intervention of children at increased risk of either disorder. Finally, if distinct, it may be possible to distinguish between HFA and AD in terms of prognosis (Macintosh & Dissanayake, 2004).

Numerous studies have been conducted in which direct comparisons have been made between individuals with a diagnosis of HFA and AD. Most of this research, however, has suffered from a lack of consistent diagnostic criteria and it has therefore been difficult to interpret and compare results (Macintosh & Dissanayake, 2004).

2.6.2 Age of onset, identification and outcome

Based on the few population studies available, Gillberg and Ehlers (1998) propose that AD may be considerably more prevalent than HFA. Howlin (2003) found the mean age at which parents of children with HFA became concerned (15 months) was earlier than that for children with AD (21 months). However, Eisenmajer et al., (1996) found that although AD was diagnosed later (M = 8.9 years) than HFA (M = 6 years), no difference was found in the age at which parents became concerned about their child's development.

The outcome for individuals diagnosed with HFA and AD is variable, some research indicating that individuals with AD have a better prognosis than people with HFA (Howlin, 2003; Szatmari, Archer, Fisman, Streiner, & Wilson, 1995).

2.6.3 Biological markers

Limited comparative research has been undertaken on aetiological and biological markers. Of the research available, no significant differences have been found between individuals with HFA and AD (Macintosh & Dissanayake, 2004). Thus, to date, there is little evidence to differentiate these conditions on aetiological or biological factors.

2.6.4 Language and communication

A clinically significant delay in language development is a distinguishing feature of HFA, whereas language development in people with AD is not significantly delayed.

Most of the comparative studies, on language and communication have focused on pragmatic difficulties and have been conducted prior to the establishment of formal criteria for AD. Based on the findings of studies using either *DSM-IV-TR* (American Psychiatric Association, 2000) or *ICD-10* criteria (World Health Organization, 1992a) (which are conceptually equivalent), it appears that the extent to which language and communication impairments differentiate the two groups may vary as a function of age (Macintosh & Dissanayake, 2004).

2.6.5 Restricted, repetitive and stereotyped patterns of behaviour, interests and activities

Little comparative research has been conducted on circumscribed interests, ritualistic behaviours or impaired imagination, even though these are accepted as core deficits for both AD and autism (Kugler, 1998). One finding suggested an absence of group differences regardless of developmental stage (Howlin, 2003), while another found children with HFA showed more severe symptoms in repetitive behaviours; however, this group difference was more verifiable in the preschool years as opposed to subsequent developmental stages (Ozonoff, South, & Miller, 2000).

2.6.6 Motor skills

Parental reports of developmental history regarding milestones and current motor skills have been examined. The research on motor skills was inconclusive, with some research finding significant differences between HFA and AD (Gillberg, 1989; Iwanaga, Kawasaki, & Tsuchida, 2000; Klin, Volkmar, Sparrow, Cicchetti, & Rourke, 1995; Rinehart, Bradshaw, Brereton, & Tonge, 2001; Szatmari et al., 1995; Szatmari, Tuff, Finlayson, & Bartolucci, 1990), while other research has found no significant differences (Eisenmajer et al., 1996; Howlin, 2003; Manjiviona & Prior, 1995; Szatmari, Bartolucci, & Bremner, 1989) and some even found similarities (Ghaziuddin, Butler, Tsai, & Ghaziuddin, 1994; Szatmari et al., 1995). Many of these studies suffered

from a lack of consistent diagnostic criteria making it difficult to interpret and compare results across studies. In addition, some studies relied heavily on parental report instead of standardised measures of motor abilities (Eisenmajer et al., 1996; Howlin, 2003; Szatmari et al., 1995; Szatmari, Bartolucci et al., 1989). It is still not clear whether motor skills differentiate HFA and AD.

2.6.7 Cognitive profiles

Some researchers found strengths and weaknesses in the cognitive profiles of individuals with HFA and AD (Ehlers et al., 1997; Iwanaga et al., 2000; Klin et al., 1995). However, the criterion specifying an absence of significant language delay in AD may determine whether or not group differences are found (Macintosh & Dissanayake, 2004). When this criterion has been adopted, it seems that individuals with HFA and AD are more likely to be differentiated on their patterns of cognitive abilities (Iwanaga et al., 2000; Klin et al., 1995). When the language delay criterion has been abandoned, thereby limiting diagnostic differentiation between the groups, few differences were found (Ozonoff, Pennington, & Rogers, 1991; Szatmari et al., 1995).

There has been a lack of consistent support for the claim that individuals with HFA and AD can be differentiated on the basis of their cognitive profiles (Macintosh & Dissanayake, 2004). For example, Miller and Ozonoff (2000) used strict *DSM-IV-TR* (American Psychiatric Association, 2000) criteria and

found HFA and AD were not clearly distinguishable on the basis of cognitive profiles and both groups showed mixed patterns of ability. These findings were consistent with other researchers who used formal diagnostic criteria (Ghaziuddin et al., 1994; Manjiviona & Prior, 1999). This suggested that no particular profile of cognitive abilities is characteristic of either disorder and thus, a specific intellectual profile cannot reliably differentiate children with HFA with AD.

2.6.8 Executive function

Executive function involves several abilities required for preparing and engaging in complex, organised behaviour, including managing impulses, planning, problem solving, and mental flexibility. Impairment of executive function has been hypothesised as a core symptom of autism and may play an important role in the repetitive behaviours and stereotyped routines commonly seen in children with ASD (Turner, 1999). The hypothesis of executive dysfunction proposes that children with autism are impaired on tasks that require higher order cognitive processes, such as inhibition (Pennington & Ozonoff, 1996). Comparative studies on executive function have revealed no differences between individuals with HFA and AD (Manjiviona & Prior, 1999; Ozonoff, Pennington et al., 1991; Szatmari et al., 1990). However, the participants in each group showed deficits in at least some areas of executive function which was relative to participants without

one of the ASD. These results have been substantiated by recent studies using *DSM-IV-TR* (American Psychiatric Association, 2000) criteria (Ghaziuddin et al., 1994; Miller & Ozonoff, 2000; Ozonoff et al., 2000). The evidence suggests that executive function does not differentiate HFA and AD.

2.6.9 Central coherence

Central coherence is the process of perceiving a meaningful whole or gaining meaning from what is observed. It is believed that individuals with ASD have a weak central coherence, that is, a tendency to examine separate or unconnected stimuli, or parts of the stimulus, rather than perceiving a meaningful whole (Deruelle, Rondan, Gepner, & Tardif, 2004; Frith, 1989).

There is limited comparative research on central coherence. Rinehart, Bradshaw, Moss, Brereton and Tonge (2000) examined interference effects of global and local stimuli on the responses of young people with HFA and AD during a computer-based task. No differences were found between the clinical groups in the number of errors associated with the interference of local detail on global processing. Results were interpreted as supporting the notion that autism and AD belong on the same continuum.

2.6.10 Psychiatric co-morbidity

There is evidence of greater psychiatric co-morbidity in AD compared with HFA. For example, Szatmari (1991) and Szatmari et al. (1989) suggested that anxiety symptoms and a schizotypal personality are more common in AD. Tonge et al. (1999) found high rates of emotional and behavioural disturbance in young people with HFA and AD. However, according to parent reports young people with AD showed more symptoms of anxiety and disruptive anti-social behaviour than young people with HFA (Tonge et al., 1999). It is important to note that differences have not always been found between the groups on co-morbid psychiatric disorders. For example, on the basis of parental report, Kim et al. (2000) found equally high rates of anxiety and depression in children and adolescents with HFA and AD. Similarly, Howlin (2003) found comparable rates of co-morbid psychiatric conditions in individuals with the two disorders.

2.6.11 Social interaction skills

Research shows that individuals with HFA and AD have significant impairments in social functioning (Szatmari et al., 1995; Szatmari, Bartolucci et al., 1989; Szatmari et al., 1990). That is, they often use language inappropriately in their social interactions and lack non-verbal communication skills when interacting with others. Despite the fact that impairments in socialisation are a core feature of both disorders, comparative research on

social behaviour is very limited. The research to date has relied almost exclusively on parent and teacher reports and suffers from a lack of consistent diagnostic criteria (Szatmari, Bartolucci et al., 1989; Szatmari et al., 1990).

On the basis of parent reports, Szatmari et al. (1995) found that children with both HFA and AD showed deficits in social and communicative competence, and where differences existed, these were in the direction of children with AD demonstrating superior social interaction skills. It has been shown that children with AD have a stronger desire for friendship and a greater ability to engage in pro-social behaviours than children with HFA. But they do not necessarily have a superior ability to form and maintain these friendships (Eisenmajer et al., 1996; Gillberg, 1989). If children with AD have a stronger desire for friendship and a greater ability to engage in pro-social behaviours, then they should have a superior ability to form and maintain friendships, even though their skills might not be very advanced. The results reflect a lack of consistent diagnostic criteria used in the previous research making it difficult to interpret and compare the results. Furthermore, the findings have been influenced by the way in which social skills and friendship seeking behaviours were measured. These studies relied on parental report rather than professional observation which may have produced different findings about the social functioning of children with AD. While there are some

differences in social competence in young children with HFA and AD, it seems with age, these differences disappear. For example, on the basis of retrospective parental reports Ozonoff et al. (2000) found that at four to five years of age, children with AD showed fewer deficits in reciprocal social interaction than the HFA group. However, when the participants were aged between six and 21 year old, these differences no longer remained. Furthermore, Gilchrist et al. (2001) found that in early development, children with AD showed fewer deficits than those with HFA in imitative social play, physically preparing themselves to be lifted, attention and help-seeking, and greeting behaviour. However, on the basis of parent report, there were no differences between the groups once the children reached adolescence (Gilchrist et al., 2001).

In summary, most of the studies comparing individuals with HFA and AD suggest there are few qualitative differences between the two conditions. Most of the research, however, suffers from a lack of consistent diagnostic criteria and therefore it is very difficult to interpret and compare results across studies.

The present study, investigating self-understanding in high-functioning males with ASD, and the relationship to social functioning and theory of mind (ToM) will add to the growing body of research on children and adolescents with

HFA and AD. Strict operational definitions of HFA and AD were applied to avoid confusion caused by the inadequate and inconsistent criteria evident in previous research. Further information about differential diagnostic process is set out in chapter five (Methodology). A review of the literature on self-understanding and ToM follows.

Chapter 3

Self-understanding

3.1 Self-understanding

Self-understanding is a multifaceted construct comprising several dimensions that define a person's view of his or her "personhood" or individuality. These dimensions typically include physical attributes, cognitive and psychological features as well as interpersonal and social dimensions that ensure a connection to society, integration into a social-cultural world, and most importantly, differentiation from others (Plesa-Skwerer, Sullivan, Joffre, & Tager-Flusberg, 2004).

Self-understanding develops over time and is shaped by particular cognitive abilities and limitations from each developmental stage. Self-understanding is influenced by socialisation experiences, including interactions with parents, siblings, teachers and peers, and the wider socio-cultural environment (Harter, 1999).

Self-understanding in infants and toddlers is focused on self-awareness which is often measured by perceptual image tasks (Bullock & Lutkenhaus, 1990) and some of these techniques include mirror self-recognition (Amsterdam, 1972; Asendorpf & Baudonniere, 1993,1996; Bertenthal & Fischer, 1978; Butterworth, 1990; Gullap, 1970; Lewis & Brooks-Gunn, 1979; Mans, Cicchetti, & Sroufe, 1978) and picture self-recognition (Lewis & Brooks-Gunn, 1979).

Development in speech and language allows the young child to reveal further dimensions of self-understanding. These dimensions include references to the self in everyday speech. For example, the use of their own name and personal pronouns to refer to self (Brown, 1973) and the use of internal states (Bretherton & Beeghly, 1982).

In older children and adolescents self-understanding is measured using self-descriptions and self-evaluations. These techniques include use of emotions associated with self-evaluation (Lewis, Sullivan, Stranger, & Weiss, 1989; Stipek, Gralinski, & Kopp, 1990) and self-description of representational characteristics (both neutral and evaluative) (Stipek et al., 1990).

3.2 The self-as-subject and the self-as-object

The study of self-understanding can be traced back to ancient Greek philosophy, as revealed in the ancient Greek aphorism “know thyself”. However, contemporary scholars of the self almost always acknowledge the work of William James (1961/1892) as one of the most influential theorists on self development (Damon & Hart, 1988). James argued there are two distinct but related aspects of the self, the subjective ‘*I*’ (the self-as-subject) and the objective ‘*me*’ (the self-as-object).

The subjective ‘*I*’ (self-as-subject) is the “self-as-knower”, the aspect of self that continually organises and interprets experience in a subjective manner (James, 1961/1892). The essence of the ‘*I*’ aspect of self is its subjectivity. The ‘*I*’ incorporates precisely those experiential features of self that elude all other constructs. The ‘*I*’ more than any other aspect of the person requires a special “self” notion to express (Damon & Hart, 1988). James (1961/1892) states that an individual may become aware of the ‘*I*’ through four types of experiences:

- the awareness of his/her *agency* over life events which provides the individual with a sense of autonomy;
- the awareness of his/her *continuity* which provides an individual with a sense of stability over time;

- the awareness of his/her *distinctness* or uniqueness of life experiences which provides the individual with a sense of one's individuality; and
- the awareness of his/her own awareness or *self-reflectivity* which provides the individual with a sense of self-consciousness.

The self-as-subject emerges from two functional aspects of the world, the ecological self and the interpersonal self (James, 1961/1892). The self-as-subject has its origins in the predisposed capacity to sense order, consistency and regularity in the information registered by the infant (Hobson, 2002). This information may be organised in terms of what is physically available (the ecological self) and what is available through other people (the interpersonal self).

Compared with the interpersonal self, the ecological self appears to be intact in young people with ASD. For example, clinical descriptions of young people with ASD illustrate their relatively good skills in negotiating their environment, in contrast to their marked difficulties relating to people (Asperger, 1944/1991; Kanner, 1943). Thus, because the ecological self appears to be intact in young people with ASD the theory and evidence supporting the ecological self will not be taken further in this study.

The interpersonal self develops through a series of stages as the infant's other capacities emerge and develop (Hobson, 1990). The reactions of babies to their physical and social environments are based upon a predisposed capacity to hold primary representations of their perceived reality, whereas secondary representations, however, are detached or separated from one's immediate perceptual reality (Hobson, 2002). Thus, an accurate awareness requires secondary representation. The self-as-object is not a direct perception of the self but rather a constructed mental model. The emergence of the self-as-object is now considered.

The objective '*me*' aspect of self (self-as-object) is known as "the sum total of all a person can call his" (James, 1961/1892). James states the '*me*' aspect of self comprises three primary constituents:

- the material characteristics of the self, which include one's body and possessions;
- the social characteristics of the self, which include one's relations, roles and personality; and
- the spiritual characteristics of the self, which include one's conscious, thoughts and psychological mechanisms.

James (1961/1892) wrote that each individual organises the constituents of the 'me' into a hierarchical structure with the bodily *me* at the bottom, the spiritual *me* at the top, and the extra-corporeal material selves and the various social selves in between. Damon and Hart (1982) proposed a fourth constituent, the active self, which includes active qualities of the self or typical activities that one performs. In contrast to James (1961/1892) Damon and Hart (1988) argue that each constituent of the 'me' develops in its own right and alongside the others.

The self-as-object emerges from the co-ordinated communications between a young child and their carers as evidenced by joint attention, social referencing, imitation and social role-taking (Hobson, 2002). Joint attention involves the ability to focus on oneself, an object or event and another person with the sole purpose of sharing interest (Kasari, Freeman, & Paparella, 2001). The capacity of young children to engage in joint attention has been supported by research including a series of studies conducted by Butterworth and Cochran (1980).

Social referencing refers to the capacity to register and respond to another person's affective orientation toward objects, other people or events within a shared environment (Hobson, 1990). Research suggests that one-year old

children can register and respond to their mothers' emotional state towards a shared situation (Sorce, Emede, Campos, & Klinnert, 1985).

Imitation refers to the capacity of the young child to recognise and identify with other people (Meltzoff, 1988b,1990). Research indicates that there are at least three types of imitation displayed by young children (Meltzoff, 1990). The simplest form of imitation is social modelling where the young child imitates the actions of another person while they are being performed. A more cognitively demanding form of imitation is deferred imitation, where the young child holds a mental representation of the event and recalls it later. The most cognitively demanding form of imitation is social mirroring, where the young child recognises his/her own actions as being imitated by another person. Deferred imitation and social mirroring are particularly important in the development of self-understanding because they highlight the young child's capacity to psychologically link in with another person (Hobson, 2002).

Social role-taking involves the ability to emotionally attune to another person (Hobson, 2002). It is an explicit demonstration of one person's awareness of him/herself as similar, but at the same time differentiated from other people's psychological stances that he/she may adopt in relation to the world. Social role-taking is important in the development of self-understanding, theory of mind and empathy (Hoffman, 1982).

Joint attention, social referencing, imitation and social role-taking are examples of secondary inter-subjectivity and are a reflection of awareness of the self as similar to but separate from others. This new level of awareness enables children to reflect upon and categorise the attitudes of others towards the self.

Section 3.3 will summarise the development of self-understanding in typically developing (TD) children and adolescents. This is important for the present study because self-understanding in young people with ASD may be delayed or limited to one of the early stages.

3.3 The development of self-understanding

Self-understanding in children and adolescents typically develops over six stages (Harter, 1999). The differences in these six stages show an increasing sophistication of self-understanding with age. At each stage, however, certain aspects are granted more significance. The critical aspects of each stage are described below.

In early childhood the young child tends to refer to him/herself in terms of typical activities, physical appearance and material possessions (Harter, 1999). In this age group, the social sense of self is not as prominent as the

physical, active and psychological self and is restricted to an expression of basic emotions and preferences (Harter, 1999).

In middle childhood, self-understanding is still restricted to activities, physical attributes and material possessions, but these self-descriptions tend to be more detailed than in early childhood (Harter, 1999). During this period, children begin to coordinate concepts and use opposites (e.g. good, bad) to describe their abilities and there is a tendency to overestimate skills. An important development during this period is the realisation that other people have viewpoints toward the self which is used as a self-guide for behaviour (Higgins, 1991). During middle childhood self-understanding is based on comparisons of self now and in the past (Suls & Sanders, 1982).

In late childhood there is a significant shift in self-understanding. The child continues to define the self in terms of activities, but adds personal efforts, talents and wishes which are understood to be important aspects of the self (Harter, 1999). The awareness of others seems to be more acute, and the self is defined in comparison to others (Secord & Peevers, 1974). In addition, the child considers his/her own abilities in relation to others' reactions. This forms the basis for the child's social self (Harter, 1999).

The period of adolescence represents a dramatic developmental transition and physical and cognitive changes occur. Self-understanding in early adolescence moves from the use of evaluative terms (e.g. smart, good etc.) to evaluation of the self as an individual (Harter, 1999). Furthermore, the social self is now defined in terms of personality characteristics that influence one's social appeal. Self-understanding during this period becomes increasingly differentiated to become a construction of multiple selves that vary across different roles and relationships (Grecas, 1972; Griffin, Chassin, & Young, 1981; Hart, 1988; Harter, 1988; Harter, Bresnick, Bouchey, & Whitesell, 1997; Harter & Monsour, 1992; Smollar & Youniss, 1985).

In mid-adolescence self-understanding broadens to include personal attributes as described by others. Self-understanding is heightened as young people become preoccupied with what others think of them (Broughton, 1978; Elkind, 1967; Harter, 1990a, 1990b; Lapsley & Rice, 1988; Rosenberg, 1979). Cognitive-developmental advances in this stage see contradictions in self-descriptions which can lead to concerns over which characteristics reflect one's true self (Harter, 1999).

In late adolescence self-descriptions continue to include social and personality characteristics and moral and personal evaluations also influence the self (Damon & Hart, 1988; Secord & Peevers, 1974). The emphasis on

self-understanding shifts away from the constituents of James's self-as-object and moves towards aspects of self-as-subject. There is a focus on the self into the future and the young person moves towards an integration of disparate aspects of self into an internally consistent construct system (Harter, 1999).

The development of self-understanding in typically developing children and adolescents has been reviewed. The following section investigates the literature on self-understanding in young people with high-functioning ASD.

3.4 Self-understanding in young people with autism spectrum disorders

The present study aims to systematically examine self-understanding in young males with high-functioning ASD compared with a TD comparison group. It will seek to determine whether self-understanding is related to an understanding of others' mental states (theory of mind: ToM). Furthermore, this study aims to examine the characteristics and abilities of young males with high-functioning autism (HFA) and Asperger's disorder (AD) to determine whether there are any significant differences in self-understanding and theory of mind between these two groups. The section below is focused on the literature on self-understanding in ASD. The ability to understand others' mental states (ToM) will be considered in chapter four.

As mentioned, the self-as-object emerges from the co-ordinated communications between a young child and their carers as evidenced by joint attention, social referencing, imitation and social role-taking (Hobson, 2002). These early co-ordinated communications are important because they reflect an awareness of the self as similar but separate from others and have been shown to be impaired (to varying degrees) in individuals with ASD. For example, children with ASD have difficulties with the following:

- joint attention (Attwood, Frith, & Hermelin, 1988; Baron-Cohen, 1989d,1995; Loveland & Landry, 1986; Mundy, Sigman, & Kasari, 1994);
- social referencing (Mundy, Sigman, Ungerer, & Sherman, 1986)
- imitation (Charman & Baron-Cohen, 1994; Dawson & Adams, 1984; Dawson & Galpert, 1990; Dawson, Meltzoff, Osterling, Rinaldi, & Brown, 1998; Hobson & Lee, 1999; Nielsen, Suddendorf, & Dissanayake, 2006), and
- social role-taking (Baron-Cohen, Leslie, & Frith, 1986; Dawson & Fernald, 1987; Oswald & Ollendick, 1989; Yirmiya, Sigman, Kasari, & Mundy, 1992).

Hobson (1990) claims that children with autism lack the prerequisites for self-understanding and thus fail to develop an “interpersonal self”. He suggests that children with autism fail to see themselves as subjects of experience and lack the capacity to think of themselves as thinkers. He reasoned that self-understanding (or self-knowledge) is critical to understanding the mental states of others and suggests that because children with autism lack a sense of “themselves” as potential objects of other people’s evaluations they fail to develop a ‘concept of persons’.

Three studies on the self-understanding of persons with ASD were discovered, two of these studies were focused on individuals with ASD who had an intellectual disability (Lee & Hobson, 1998; Yoshii & Yoshimatsu, 2003). Consistent with Hobson’s argument, the findings from these two studies suggest that verbally able children with ASD express a more restricted range of emotions and tend not to view themselves in terms of social activities and relations.

Mavropoulou (1995) reported an examination of self-understanding in seven children with “autistic tendencies” compared with nine children with moderate learning difficulties and six adults “thought to have” Asperger’s syndrome. Mavropoulou (1995) administered Damon and Hart’s (1988) self-understanding interview and reported that the children with autistic

tendencies persisted in describing physical and active aspects of themselves and made no references to their social and psychological characteristics. In contrast, social and psychological aspects were frequently elicited in the responses from the moderate learning difficulties group. The autistic tendencies group tended to maintain physicalistic views for the formation of self, its continuity and distinctness. For example, in describing themselves verbally able children with autism distinguished themselves from others on the basis of their name, age, possessions and typical behaviour; whereas the moderate learning difficulties group made comparisons based on their talents, abilities and efforts.

Mavropoulou's (1995) study revealed an interesting pattern of responses by young people with ASD. Lee and Hobson (1998) however, identified several methodological weaknesses: inadequacy of diagnoses, lack of quantification and reliability of ratings. These methodological issues have been addressed by Lee and Hobson (1998) in another study on self-understanding in young people with autism which will be reviewed below.

Lee and Hobson (1998) investigated self-understanding in twelve adolescents with autism (as per criteria for autistic disorder in the *DSM-IV*) (American Psychiatric Association, 1994) who had an intellectual disability, compared with ten young people without autism who had an intellectual disability. The

participants ranged from nine to 19 years. Lee and Hobson (1998) administered Damon and Hart's (1988) self-understanding interview and found no difference in the overall quality (level of description) and quantity of statements that fell within the physical, active or psychological categories. There was, however, a difference in terms of the quality of responses given in the psychological category; children with autism gave more emphasis to their preferences rather than their emotions or intellectual capacities. Moreover, the statements by the children with autism that referred to emotions made references to being happy, excited and upset. The emotional responses from the non-autistic group were far more varied, for example, including references to being uptight, ashamed and feeling worried. The main group difference was that very few of the statements made by the children with autism referred to social relations. This study revealed that in talking about themselves, verbally able individuals with autism seemed to think about their physical features and activities in the same way as non-autistic people of the same age and intellectual ability, but they expressed a more restricted range of emotions than non-autistic individuals and tend not to view themselves in terms of social activities and relations.

A study by Yoshii and Yoshimatsu (2003) compared adolescents (aged 14 to 18 years old) with autism (as per criteria for autistic disorder in the *DSM-IV-TR*) (American Psychiatric Association, 2000) who also had an intellectual

disability with non-autistic intellectually disabled subjects. Yoshii and Yoshimatsu (2003) administered Damon and Hart's (1988) self-understanding interview and found significant differences in the self-understanding of adolescents with autism (and intellectual disability) compared with the intellectually disabled comparisons. The adolescents with autism had significantly less developed self-understanding compared with adolescents who had an intellectual disability.

Smukler (2005) argues there is no better source of evidence about a person's knowledge of self than what they say, because this gives you a view into someone's state of mind and depth of self knowledge. In spite of this there has been little in the way of systematic research into self-understanding of young people with high-functioning ASD. Evidence, however, from autobiographical writings of high-functioning individuals with ASD suggest that they have insight into their own mental states (Frith & Happe, 1999). These autobiographical writings typically include memories of early childhood, and accounts of adult life experiences. For example, Donna Williams (1994) wrote "I was sick to death of my attention wandering onto the reflection of every element of light and colour . . ." (Williams, 1994) and Temple Grandin (1992) wrote:

"As a child I was hyperactive, but I did not feel nervous until I reached puberty . . . the feeling was like a constant feeling of stage fright all the

time . . . I had a pounding heart, sweaty palms and restless movements. . . I had an odd lack of awareness of my oddities of speech and mannerisms. . .” (p. 111).

These autobiographical accounts show that adults with ASD are able to describe themselves and show insight into their own mental states. However, these narratives are difficult to interpret and assess, they do not show that these individuals must have been aware of their own mental states at the time in question and unlike other biographers they are not wondering about how the reader might see them and their families (Frith & Happe, 1999).

Research on individuals with AD using an experience sampling interview technique found that out of the three AD subjects interviewed, two were able to think and talk about their inner experiences (Hurlburt, Happe, & Frith, 1994). Another important finding was, compared to TD subjects, individuals with AD showed no interest in, or curiosity about, how their own inner experiences might differ from those of others.

Self-competence and emotion understanding have been investigated in young people with high-functioning ASD. For example, research by Capps, Sigman & Yirmiya (1995) found perceived self-competence was lower for high-functioning children with ASD compared to a typically developing (TD)

comparison group and was lowest among the most highly intelligent autistic children. These highly intelligent children showed they had greater access to their own and others' emotional experiences; they were able to talk about their own emotional experiences with ease (Capps, Yirmiya, & Sigman, 1992) and were more accurate in labelling the emotions of others (Yirmiya et al., 1992). This, and other research (Hill, Berthoz, & Frith, 2004; Humphrey & Lewis, 2008; Meyer, Mundy, Vaughan Van Hecke, & Durocher, 2006) suggests that individuals with high-functioning ASD had enough insight to report their own mental states and have a sense of distinctness from others.

3.5 Damon and Hart's model of self-understanding

Damon and Hart (1982; 1988) constructed a comprehensive framework for studying both the structural organisation and developmental changes of self-understanding from early childhood to late adolescence. The model is represented in Figure 1; the horizontal dimension corresponds to the self-as-subject and self-as-object schemes. The vertical dimension in the figure represents the progression through which the components themselves develop.

Damon and Hart (1982; 1988) utilised this model as a theoretical starting point for developing their semi-structured self-understanding interview. Responses to interview questions are classified according to a coding

scheme consisting of four self-as-object categories: physical, active, social and psychological aspects of the self and three self-as-subject categories: continuity, distinctness and agency.

Figure 1: The developmental model of self-understanding (adapted from Damon and Hart, 1988)

Level and Period for functioning in each category	General Organising Principle	Agency	Continuity	Distinctness	Physical Self	Active Self	Social Self	Psychological Self
1 Early Childhood	Categorical Identifications	External uncontrollable factors determine self	Categorical identifications	Categorical identifications	Bodily properties or material possessions	Typical behaviour	Fact of membership in particular social relations or groups	Momentary moods, feelings, preferences and aversions
2 Middle to late Childhood	Comparative Assessments	Efforts, wishes and talents influence self	Permanent cognitive and active capabilities and immutable self-characteristics	Comparisons between self and other along isolated dimensions	Capability-related physical attributes	Abilities relative to others, self or normative standards	Abilities or acts considered in the light of others' reactions	Knowledge, cognitive abilities, or ability related emotions
3 Early Adolescence	Inter-personal Implications	Communication and reciprocal interaction influence self	Ongoing recognition of self by others	Unique combinations of psychological and physical attributes	Physical attributes that influence social appeal and social interactions	Active attributes that influence social appeal and social interactions	Social personality characteristics	Social sensitivity, communicative competence, & other psychologically related social skills
4 Late Adolescence	Systematic Beliefs and Plans	Moral or personal evaluations influence self	Relations between past, present, and future selves	Unique subjective experience and interpretations of events	Physical attributes reflecting volitional choices, or personal and moral standards	Active attributes that reflect choices, personal or moral standards	Moral or personal choices concerning social relations or social personality characteristics	Belief systems, personal philosophy, self's own thought processes
SELF-AS-SUBJECT					SELF-AS-OBJECT			

The four self-as-object categories are defined as physical aspects which relate to the self's physical body and material possessions; active aspects that include one's active activities and abilities; social aspects of the self, which denote an awareness of one's social personality characteristics, social interactions, or social relations and psychological aspects, which describe an awareness of one's emotions, thoughts, or cognitive processes.

The three self-as-subject categories are defined as continuity, the awareness of the self's personal changes over time; distinctness, the awareness of being different or distinct from others and agency, the awareness of one's intentional actions and self-monitoring of these actions.

Damon and Hart (1988) argue that all aspects of the self are present from early childhood; however within each component there are levels which reflect a developmental progression. Thus, categories are further classified into four levels, reflecting an increase in the complexity of self description, from defining the self in concrete terms of surface, observable characteristics, to a concept of the self as perceived in reference to the reactions of others and to one's life philosophy (Plesa-Skwerer et al., 2004). Further information about the self-understanding interview is set out in chapter five (Methodology).

3.6 Summary

Self-understanding is a multifaceted construct comprising several dimensions that define a person's view of his or her "personhood" or individuality. William James (1961/1892) argued there are two distinct but related aspects of the self, the subjective '*I*' (the self-as-subject) and the objective '*me*' (the self-as-object). The subjective '*I*' (self-as-subject) is the "self-as-knower", the aspect of self that continually organises and interprets experience in a subjective manner. In contrast, the objective '*me*' aspect of self (self-as-object) is known as "the sum total of all a person can call his".

Three studies on self-understanding of persons with ASD were discovered and two of these studies were focused on individuals with ASD who also had an intellectual disability (Lee & Hobson, 1998; Yoshii & Yoshimatsu, 2003) and another study was on high-functioning children with autistic tendencies and adults thought to have Asperger's disorder. The findings from these three studies suggested that verbally able individuals with ASD express a more restricted range of emotions than TD individuals and tend to be less likely to view themselves in terms of social activities and relations.

There has been little systematic research into the self-understanding of young people with high-functioning ASD. Evidence, however, from related studies (e.g. self-concept and autobiographical writings of high-functioning individuals

with ASD) has suggested that they have insight into their own mental states and have a sense of distinctness from others (Frith & Happe, 1999).

Various aspects of the self are integrated in the model proposed by Damon and Hart (1988) which forms the theoretical basis of the interview used in the present study. The following chapter (Chapter 4) will investigate the ability to understand others' mental states (theory of mind).

Chapter 4

Theory of mind

4.1 Theory of mind

Theory of mind (ToM) is the ability to infer the psychological states of other people (Premack & Woodruff, 1978). Specifically, ToM is a person's understanding that they and other people act on the basis of mental states such as desires, intentions, emotions and beliefs. These mental states are used to both predict and explain behaviour (Premack & Woodruff, 1978). This ability appears to be a prerequisite for normal social interaction (Frith & Happe, 1999), communication and possibly the acquisition of language (Bloom, 1998; Frith & Happe, 1994). In addition, a well developed ToM is associated with educational success (Astington, 1988). Thus, ToM has ramifications that extend across the domains of social functioning, communication and academic achievement.

Cognitive processes are inherent to ToM. According to Leslie (1987; 1988; 1991) the cognitive system produces primary and secondary representations (or metarepresentations). The former are beliefs about concepts of the physical world. The latter are beliefs about one's own or other's primary representations. Leslie (1991) claims that metarepresentation is necessary

for attribution of any mental state, including beliefs. An individual with a fully developed representational ToM understands that he/she and other people act on the basis of their beliefs.

The neurological basis of ToM has been explored through neuropsychological and brain imaging studies (Frith & Frith, 1999; 2005). A number of studies have found that deficits in ToM are associated with damaged or reduced activation in specific parts of the brain (e.g. orbito-and medial-frontal cortex, amygdala, temporal poles and superior temporal sulcus) (Baron-Cohen, Ring et al., 1999; Baron-Cohen, Wheelwright, Stone, & Rutherford, 1999; Castelli, Happe, Frith, & Frith, 2000; Happe, Brownell, & Winner, 1999; Happe & Frith, 1996; Stone, Baron-Cohen, & Knight, 1998; Stuss, Gallop, & Alexander, 2001).

4.1.1 Theories on the development of theory of mind

Several types of theories have been offered as explanations for the development of ToM (Flavell, 2004). The theory-theory is a leading account that explains the development of ToM (Gopnik & Meltzoff, 1997; Gopnik & Wellman, 1992; Perner, 1991; Wellman & Gelman, 1998) and describes ToM as a detached theoretical process. According to theory-theory, an individual's everyday conception of the mind is an implicit theory, originating in childhood. New theories develop through the combination of conceptual structures of old

theories (e.g. recalling facts about an individual's past behaviour) and new evidence (e.g. recent social interactions). Proponents of theory-theory argue that how individuals read others' minds can be extended to provide an account of how the person reads their own mind, that is, detecting one's own attitudes engages the same inferential mechanism as detecting someone else's (Frith & Happe, 1999; Gopnik & Meltzoff, 1994). Thus, theory-theory is particularly relevant to the present study which investigates the relationship between self-understanding and the understanding of others' minds in young males with high functioning autism spectrum disorders (ASD).

Other accounts that attempt to explain the development of ToM include:

- modular accounts (Baron-Cohen, 1995; Leslie, 1994; Scholl & Leslie, 1999) that emphasise that ToM develops from dedicated neurological mechanisms;
- simulation accounts (Gordon, 1996; Harris, 1992) that emphasise that ToM develops from knowledge that allows one to mimic the mental state of another person;
- executive functioning accounts (Carlson, Moses, & Hix, 1998; Hughes, 1998; Hughes & Russell, 1993; Ozonoff, Pennington et al., 1991; Sodian, Hulsken, & Thoermer, 2003) which emphasise that

improvement in children's executive functioning with age helps make possible the acquisition of key ToM competencies; and

- sociolinguistic accounts (Astington & Baird, 2005; Dunn, Brown, Slomkowski, Tesla, & Youngblade, 1991; Garfield, Peterson, & Perry, 2001; Harris, 2005; Siegal, 1991; Tager-Flusberg, 1993) that emphasise the connection between social experience, language acquisition and the development of ToM.

4.1.2 The development of theory of mind

According to Piaget's (1929) formulation of *early childhood egocentrism*, a child does not understand that others' views and thoughts differ from his or her own. Piaget's ideas are similar to ToM, but there is general agreement among researchers that children pass ToM tasks earlier than they leave Piaget's egocentric stage (Wellman, 1990).

There are a number of early social behaviours that are considered precursors to the development of ToM. Joint attention is particularly important for the development of ToM (Charman et al., 2000). A longitudinal study conducted by Charman et al. (2000) demonstrated that children who displayed the highest rates of joint attention at 20 months scored highest on ToM tasks at 44 months.

There is a vast amount of research literature (see below) on the acquisition of ToM in typically developing children, occurring after the infancy period. In general, children develop the capacity to identify and infer mental states in the particular developmental order of feelings, perceptions, desires, intentions, and finally, beliefs (Flavell, 2004). Following is a brief summary of some of the major findings:

- 1) Feelings: Preschoolers attribute inner feelings to people who display emotions (Wellman, Harris, Banerjee, & Sinclair, 1995). In later years, children learn more advanced concepts about emotions, for example, people do not always really feel what they appear to feel (Flavell & Miller, 1998).
- 2) Perception: Preschoolers recognise that a common object may present different visual appearances to two people if viewed from different positions (Flavell, 1992). They can appreciate that attention is selective and limited and different people may mentally represent the same object differently (Fabricius & Schwanenflugel, 1994; Flavell, Green, & Flavell, 1995; Pillow, 1995).
- 3) Desires: By the age of three, children are not only using some desire terms correctly, they also seem to grasp simple causal relations among desires, outcomes, emotions, and actions which suggests they are developing an implicit theory (Bartsch & Wellman, 1995).

- 4) Beliefs: There have been many studies of children's understanding of non-pretence mental states such as beliefs that are meant to represent reality (Flavell & Miller, 1998). The majority of these studies have dealt with children's understanding of representations that differ from person to person or differ from reality (e.g. false-belief).

Children's knowledge about mental representations continues to develop past the preschool years. In particular, it is not until middle childhood and later that children appear to gain any substantial understanding of the mind as an active, interpretive, constructive processor (Barquero, Robinson, & Thomas, 2003; Carpendale & Chandler, 1996).

4.2 Theory of mind in young people with autism spectrum disorders

It has been shown that children with ASD have difficulties with those social behaviours that represent early manifestations for ToM. Children with ASD have difficulties with the following:

- joint attention (Attwood et al., 1988; Baron-Cohen, 1989d,1995; Loveland & Landry, 1986; Mundy et al., 1994);
- social referencing (Mundy et al., 1986)

- imitation (Charman & Baron-Cohen, 1994; Dawson & Adams, 1984; Dawson & Galpert, 1990; Dawson et al., 1998; Nielsen et al., 2006); and
- social role-taking (Baron-Cohen et al., 1986; Dawson & Fernald, 1987; Oswald & Ollendick, 1989; Yirmiya et al., 1992).

Imaginative or pretend play has also been marked as a function of early developing ToM ability (Baron-Cohen, 2001). Studies have reported a lower frequency of pretend play for children with autism (Baron-Cohen, 1987; Craig, 1997; Lewis & Boucher, 1988; Ungerer & Sigman, 1981; Wing, Gould, Yeates, & Brierley, 1977).

It has been hypothesised that impairments in ToM underlie the core social and communicative symptoms in ASD (Baron-Cohen, Tager-Flusberg, & Cohen, 2000). The severity of the ToM impairment is significantly greater in children with ASD than in other child populations, such as those with intellectual disabilities, schizophrenia or language impairment (Bishop, 2000; Happe, 1995; Pilowsky, Yirmiya, Arbelle, & Mozes, 2000; Serra, Loth, Van Geert, Hurkens, & Minderaa, 2002; Tager-Flusberg, 2001, 2003b; Ziatas, Durkin, & Pratt, 1998).

The extent of the impairment has been demonstrated in a number of studies employing a variety of tests (including both social-cognitive and social-perceptual measures) with children with ASD. Individuals with ASD appear to have difficulties with the following:

- mental-physical distinctions (Baron-Cohen, 1989a);
- understanding functions of the brain (e.g. dreaming, thinking etc.) (Baron-Cohen, 1989a);
- appearance-reality distinctions (Baron-Cohen, 1989a);
- seeing leads to knowing test (or difficulties understanding who knows what) (Baron-Cohen & Goodhart, 1994; Leslie & Frith, 1988);
- recognising mental state words (Baron-Cohen et al., 1986; Baron-Cohen et al., 1994; Tager-Flusberg, 1992);
- understanding complex causes of emotions (such as beliefs) (Baron-Cohen, 1991; Baron-Cohen, Spitz, & Cross, 1993);
- inferring mental states from eye-gaze direction (Baron-Cohen, 1989c; Baron-Cohen, Baldwin, & Crowson, 1997; Baron-Cohen, Campbell, Karmiloff-Smith, Grant, & Walker, 1995; Baron-Cohen & Cross, 1992; Brent, Rios, Happe, & Charman, 2004; Hobson, 1984; Leekam, Baron-Cohen, Brown, Perrett, & Milders, 1997);
- identifying the underlying intention behind a character's utterance that was not true in strange stories (Brent et al., 2004);

- monitoring one's own intentions (Phillips, Baron-Cohen, & Rutter, 1998);
- production of deception, but also understanding when someone else is deceiving them (Baron-Cohen, 1992; Sodian & Frith, 1992; Yirmiya, Solomonica-Levi, & Shulman, 1996; Yirmiya, Solomonica-Levi, Shulman, & Pilowsky, 1996)
- understanding metaphors, sarcasm, jokes and irony (Baron-Cohen, 1997; Happe, 1994); and
- the use of language appropriate to the social context (pragmatics) (Baron-Cohen, 1988; Baron-Cohen, O'Riordan, Jones, Stone, & Plaisted, 1999; Tager-Flusberg, 1993).

4.2.1 False-belief understanding

A common approach to assessing ToM in children with ASD has focused on the attainment of false-belief understanding, which is the understanding that others hold a belief whose content contradicts reality (Wellman, Cross, & Watson, 2001). False-belief understanding is considered a conceptual perspective-taking skill and is typically measured by social-cognitive tasks which relate to the understanding that different people have different thoughts about the same situation. The ability to attribute false-beliefs to oneself and others, which is normally acquired at around four years of age (Wimmer &

Perner, 1983), is considered a particularly important milestone in the development of ToM. False-belief attribution marks the emergence of a representational concept of mind, whereby children implicitly understand that mental states are subjective representations of the world which are independent of, and not necessarily congruent with, reality (Astington & Gopnik, 1991; Perner, 1991; Wellman, 1990).

A large number of research studies have demonstrated that children with ASD have difficulties with attributing false-beliefs to someone else, and instead children with ASD tend to report what they themselves know (Baron-Cohen, Leslie, & Frith, 1985; Baron-Cohen et al., 1986; Leekam & Perner, 1991; Perner, Frith, Leslie, & Leekam, 1989; Reed & Peterson, 1990; Swettenham, 1996; Swettenham, Baron-Cohen, Gomez, & Walsh, 1996).

First-order belief tests are a standard approach to assessing false-belief understanding. These tests involve inferring one person's mental state (Wellman, 1990). Typically developing (TD) children achieve competence in first-order false-belief tests by four years of age (Bartsch & Wellman, 1995; Wellman & Bartsch, 1988; Wimmer & Perner, 1983).

In comparison, individuals with ASD are typically much older than four years when they pass first-order false-belief tests. Happe (1995) found that on

average a verbal mental age of nine years old for children with ASD was required before succeeding on such tests, and the lowest mental age in the sample was 5 ½ years (Happe, 1995).

Results consistently show that first-order beliefs are understood before second-order beliefs (Silliman et al., 2003). Second-order false-belief tests involve coordinating multiple perspectives about what two characters are thinking in a situation where the conflicting beliefs of the two characters are known to the participant but not to the characters (e.g. what John thinks Mary thinks). The understanding of second-order false-beliefs (especially implicit false-beliefs) is often considered a “litmus test” (Bauminger & Kasari, 1999) of a ToM because of the complexity of making inferences.

TD children achieve competence in second-order false-belief tests by approximately 6 years of age. In comparison, young people with ASD often fail second-order false-belief tasks (Baron-Cohen et al., 1986).

Some individuals with high-functioning ASD have shown that they can pass second-order false-belief tests (Bowler, 1992; Happe, 1993; Ozonoff, Rogers, & Pennington, 1991; Ziatas et al., 1998). The pass rate is typically correlated with higher verbal ability as measured by standardised vocabulary tests (Happe, 1995; Kazak, Collis, & Lewis, 1997; Sparrevohn & Howie, 1995;

Tager-Flusberg & Sullivan, 1994; Ziatas et al., 1998) and cognitive ability as measured by standardised IQ tests (Bauminger & Kasari, 1999). These findings indicate that language ability and cognitive functioning are associated with successful performance on ToM tasks. However, deficits in ToM can be revealed in individuals with high-functioning ASD (usually adults) for whom comprehension problems can be ruled out. For example, individuals with high-functioning ASD showed deficits in performance on the Reading the Mind in the Eyes task (Baron-Cohen, Jolliffe, Mortimore, & Robertson, 1997).

Current research efforts tend to focus on the similarities and differences in false-belief understanding among individuals with HFA and those with AD (Baron-Cohen, 1989b; Baron-Cohen et al., 1985; Sigman, Arbelle, & Dissanayake, 1995). Results from these studies suggest that deficiencies in first and second-order abilities are common to both individuals with HFA and those with AD. Other available evidence indicates that these deficits are less characteristic of AD, and suggest that this may be a basis on which the two conditions can be distinguished (Ozonoff, Rogers et al., 1991; Ziatas et al., 1998).

Studies indicating differences in ToM abilities have often been criticised on the grounds that these findings could be attributable to poor subject matching on verbal IQ (VIQ). There has been strong evidence for a positive correlation

between verbal skills and ToM abilities (Eisenmajer & Prior, 1991; Ozonoff, Rogers et al., 1991; Prior et al., 1998). The pass rate has also been correlated with cognitive ability as measured by standardised IQ tests (Bauminger & Kasari, 1999). Thus, apparently better ToM capacity in people with AD may reflect their higher verbal and cognitive abilities (Bauminger & Kasari, 1999; Ozonoff & McMahon Griffith, 2000; Volkmar & Klin, 2000; Wing, 1998). However, passing the second-order false-belief question does not mean that participants are able to justify their answer (explain the reason for their response) appropriately (Bauminger & Kasari, 1999).

The present study will examine false-belief understanding in young males with high-functioning ASD with a particular focus on verbal and other cognitive abilities and the justification of responses on the second-order test. The study will examine ToM ability among young males with HFA compared with those with AD to determine if there are qualitative differences between the two conditions.

4.2.2 Theory of mind and social functioning

A number of studies have shown that ToM development in children has consequences on their social behaviour (Jenkins, 2000; Rapacholi, Slaughter, Pritchard, & Gibbs, 2003). Most studies suggest that children with more advanced ToM (especially false-belief) tend to have more successful

social relationships than their less advanced peers (Watson, Nixon, Wilson, & Capage, 1999). The causal relationship between ToM and social behaviour is complex and bidirectional, with social behaviour providing a context for ToM acquisitions as well as the converse (Astington, 2003).

When it comes to children with ASD the relationship between the ability to reason about others' mental states (ToM) and real life social skills is unclear. Some studies show a significant correlation between ToM skills and social functioning (Frith, Happe, & Siddons, 1994; Tager-Flusberg, 2003a), while a number of studies have failed to find an association (Bowler, 1992; Dawson & Fernald, 1987; Fombonne, Siddons, Achard, Frith, & Happe, 1994; Klin, 2000; Peterson, Slaughter, & Paynter, 2007; Prior, Dahlstrom, & Squires, 1990; Roeyers, Buysse, Ponnet, & Pichal, 2001; Sparrevohn & Howie, 1995).

A number of explanations have been provided for the lack of observed significant associations between ToM and social functioning. Some of the reasons include the following:

- 1) The "hacking" hypothesis which postulates that children with high-functioning ASD who pass ToM tasks, do so via alternative compensatory strategies (Dissanayake & Macintosh, 2003).

- 2) ToM ability may influence only a relatively narrow range of social behaviours rather than social competence in the broader sense (Astington, 2003; Frith et al., 1994).
- 3) The relationship may be influenced by the tests used to measure ToM and social functioning (e.g. parent report or teacher report of social functioning versus observational measures) (Dissanayake & Macintosh, 2003; Frith et al., 1994).
- 4) The differences in verbal ability between study groups (Fombonne et al., 1994).
- 5) Motivation may be required before children apply false-belief understanding to real-life interactions (Astington, 2003).
- 6) Social functioning may be less dependent on ToM ability and more reliant on other skills such as visual processing (Klin, Jones, Schultz, Volkmar, & Cohen, 2002; Osterling & Dawson, 1994).

4.2.3 Theory of mind and self-understanding

Few studies have explored the relationship between self-understanding and the understanding of others' mental states (ToM). A study with TD pre-adolescents (Bosacki, 2000) found a robust positive relationship between self-understanding and ToM. This finding was consistent with other studies and found positive connections between self-understanding and the understanding of others' mental states (Banerjee & Yuill, 1999; Gopnik &

Meltzoff, 1994; Hatcher, Hatcher, Berlin, Okla, & Richards, 1990; Homer & Astington, 1995; Lang & Perner, 2002; Wimmer & Hartl, 1991) and with the theory-theory explanation of social understanding.

Proponents of theory-theory argue that the way in which an individual reads another's mind, can be extended to provide an account of how that person reads their own mind. That is, detecting one's own attitudes engages the same inferential mechanism as detecting someone else's (Frith & Happe, 1999).

There has been one published study located on the relationship between self-understanding and ToM in autism (Yoshii & Yoshimatsu, 2003). This study was focused on self-understanding and ToM in adolescents with autism who had an intellectual disability. The researchers found significant differences in both self-understanding and ToM, with adolescents with autism (and intellectual disability) performing at a lower level than adolescents with an intellectual disability. The researchers found that adolescents who performed better on the self-understanding interview also performed better on ToM tasks. The results suggest there is a significant positive relationship between self-understanding and understanding others in low-functioning adolescents with autism (Yoshii & Yoshimatsu, 2003) and thus support theory-theory as a useful theoretical framework.

There has been no research located on the relationship between self-understanding and ToM in young people with high-functioning ASD. This study aims to systematically investigate self-understanding in young males with high-functioning ASD and to discover whether self-understanding is related to ToM. Proponents of theory-theory suggest that detecting one's own mental states engages the same inferential mechanism as detecting someone else's. If self-understanding and ToM are linked, then the fact that these individuals have difficulties with ToM tasks may imply they also have difficulties with the ability to reflect on their own mental states. Moreover, the degree of the two abilities should be related. If the two abilities are related in ASD then it is possible that the same inferential mechanism is involved for young males with high-functioning ASD.

4.2.4 Clinical implications of research on theory of mind

Despite a vast amount of research on self-understanding in TD children and adolescents, there has been little research located on young people with ASD. There have only been three studies located on self-understanding in ASD; two studies focused on individuals with ASD who had an intellectual disability (Lee & Hobson, 1998; Yoshii & Yoshimatsu, 2003) and one study focused on high-functioning ASD (Mavropoulou, 1995). The results from the

Mavropoulou study (1995) suggested verbally able children with ASD express a more restricted range of emotions and tend not to view themselves in terms of social activities and relations. However, methodological issues make the results from this study difficult to interpret.

There has been no systematic research located on self-understanding in young people with high-functioning ASD. The present study aims to investigate self-understanding in young males with high-functioning ASD and to discover whether self-understanding is related to social functioning and ToM.

While the possibility of impaired self-understanding in ASD has been raised previously (Lee & Hobson, 1998; Mavropoulou, 1995), it is not yet clear whether young people with high-functioning ASD have difficulties with self-understanding and how this translates to their social functioning. Individuals with high-functioning ASD generally have difficulties attributing mental state terms to others to predict behaviour but it is not known if this ability is related to self-understanding and whether the same cognitive mechanism is underlying the two abilities.

The present study will also examine similarities and differences in self-understanding between young people with HFA and those with AD and

determine whether self-understanding is related to social functioning and ToM. The results will add to the growing body of research which assists in the development of diagnostic classification systems and social skills interventions for young people with HFA and AD.

4.2.5 Summary

People with ASD clearly have difficulties with ToM, since the deficits can be found in the highest of functioning individuals in whom comprehension problems can be ruled out. Although the deficit in ToM is not a diagnostic criterion for ASD, the difficulties appear to occur early and to be universal.

Several theories have been provided as explanations for the development of ToM. Proponents of theory-theory have made a theoretical link between self-understanding and the understanding of others' mental states (ToM). If theory-theory is correct then it is likely that the same cognitive mechanism underlies the self-understanding and ToM.

4.3 Study overview

This will be the first known study to systematically examine self-understanding in young males with high-functioning ASD. This study aims to examine self-understanding and the relationship between social functioning and ToM among young males with high-functioning ASD compared with TD

comparisons. The results may indicate a positive relationship exists between self-understanding and social functioning which will support the teaching of self-understanding in social skills training programs. Similarly, self-understanding may relate to ToM for young males with ASD, suggesting that the same cognitive mechanism is involved. The results may also suggest that interventions aimed at improving self-understanding may also improve ToM. If self-understanding is related to ToM, the present study will support theory-theory as a useful theoretical framework for understanding young males with high-functioning ASD.

In addition, this study will examine the similarities and differences between young males with HFA and those with AD, to determine whether there are any differences between the groups on self-understanding. Furthermore, this study will determine whether relationships exist between self-understanding, social functioning and ToM. If the two groups are similar on the measures, then the findings from this research will support a growing body of research that demonstrates few qualitative differences between HFA and AD.

The goals of this study are to

- 1) compare the quality and quantity of self-understanding among young males with high-functioning ASD compared with a TD group;

- 2) compare the quality and quantity of self-understanding among young males with HFA compared with a AD group;
- 3) examine the relationship between self-understanding and social functioning among young males with high-functioning ASD compared with a TD group;
- 4) examine the relationship between self-understanding and social functioning among young males with HFA compared with a AD group;
- 5) compare ToM ability among young males with high-functioning ASD compared with a TD group;
- 6) compare ToM ability among young males with HFA compared with a AD group;
- 7) examine the relationship between self-understanding and ToM among young males with high-functioning ASD compared with a TD group;
- 8) examine the relationship between self-understanding and ToM among young males with HFA compared with a AD group;

4.4 Hypotheses

The hypotheses were consistently written from the null hypothesis perspective (i.e. no differences were expected). This study will specifically test the following null hypotheses:

4.4.1 Hypothesis 1: Self-understanding

Young males with high-functioning ASD are not significantly different from the TD comparison group on a measure of self-understanding.

4.4.2 Hypothesis 2: Self-understanding in HFA and AD

Young males with HFA are not significantly different from young males with AD on a measure of self-understanding.

4.4.3 Hypothesis 3: Self-understanding and social functioning

There is no significant relationship between self-understanding (as measured by scores on the self-understanding interview) and social functioning (as measured by scores from Vineland Adaptive Behavior Scales Socialization Domain) for young males with high-functioning ASD.

4.4.4 Hypothesis 4: Self-understanding and social functioning in HFA and AD

There is no significant relationship between self-understanding (as measured by scores on the self-understanding interview) and social functioning (as measured by scores from Vineland Adaptive Behavior Scales Socialization Domain) for young males with HFA and AD.

4.4.5 Hypothesis 5: Theory of mind

Young males with high-functioning ASD are not significantly different from the TD comparison group on false-belief ToM tasks.

4.4.6 Hypothesis 6: Theory of mind in HFA and AD

Young males with HFA are not significantly different from young males with AD on false-belief ToM tasks.

4.4.7 Hypothesis 7: Self-understanding and theory of mind

There is no significant relationship between self-understanding (as measured by scores on the self-understanding interview) and ToM ability (as measured by scores from the false-belief ToM tasks) for young males with high-functioning ASD.

4.4.8 Hypothesis 8: Self-understanding and theory of mind in HFA and AD

There is no significant relationship between self-understanding (as measured by scores on the self-understanding interview) and ToM ability (as measured by scores from the false-belief ToM tasks) for young males with HFA and AD.

Chapter 5

Methodology

5.1 Participants

The sample consisted of 43 young males diagnosed with one of the autism spectrum disorders (ASD) (25 diagnosed with high-functioning autism (HFA) and 18 diagnosed with Asperger's disorder (AD) and 38 typically developing (TD) males. Only males with a chronological age between 9 and 18 years and a minimum full scale IQ of 70 based on the Kaufman Brief Intelligence Test (KBIT) (Kaufman & Kaufman, 1990) were selected for the study. The chronological ages of 9-18 years were selected to allow for comparison with previous research on self-understanding in young people with ASD who also had an intellectual disability. The University of Sydney's Human Research Ethics Committee and Autism Spectrum Australia's (Aspect) Ethics Committee approved the study.

The clinical groups were recruited through Aspect and through local, metropolitan and national newspapers. All participants in the ASD group had been previously diagnosed by a paediatrician, psychiatrist or psychologist. Participants were not accepted into the study without accompanying

documentation of their diagnosis. In addition, all participants with ASD were assessed by a psychologist (experienced in the assessment and diagnosis of ASD) to confirm the diagnoses. The clinical diagnoses were based on the *Diagnostic Statistical Manual of Mental Disorders-Fourth Edition Text Revision (DSM-IV-TR)* (American Psychiatric Association, 2000) criteria using a combination of structured diagnostic interview, clinical observation and previous reports from medical, cognitive and communication assessments.

No individual with autism having a verbal mental age (VMA) of less than six years or chronological age of eight years has been recorded as passing any theory of mind task (Kleinman, Marciano, & Ault, 2001). Therefore, only those with a VMA above six years were included in the current study. One participant was excluded from the ASD group in the current study because of a VMA of five years eight months.

In terms of differential diagnosis, children were allocated to the HFA group when they met the diagnostic criteria for autistic disorder but their full-scale IQ was 70 or above (as determined by a standardised IQ test). Children were allocated to the AD group when they did not meet criteria for autistic disorder (e.g. there was no evidence of a clinically significant language delay, such that the child used single words by age three years) but still presented with qualitative impairments in reciprocal social interaction and restricted,

repetitive and stereotyped patterns of behaviour, interests and activities. In addition, they did not have delays in cognitive development or the development of age appropriate self-help skills, adaptive behaviour (other than social interaction) and curiosity about the environment in childhood.

The TD group was recruited through local, metropolitan and national newspapers. Young people with a history of a psychiatric disorders or specified developmental or behavioural disorders were excluded from the TD group. Psychiatric diagnoses were excluded using the Child Behavior Checklist (CBCL) (Achenbach & Rescorla, 2001). Two participants were excluded from the TD group because they had a history of behavioural and emotional problems.

5.2 Procedure

Participants were interviewed and assessed over two sessions by two psychologists at the Centre for Behavioural Sciences in Medicine, University of Sydney. At the beginning of the first session, participants were assured of the anonymous and confidential nature of the study and written informed consent was obtained from each parent and child (see Appendices A and B).

Sessions were structured in a way that allowed for one psychologist to interview the parent whilst the other psychologist assessed and interviewed

the child. The duration of the first session was approximately three hours. The parent interview involved administration of the CBCL (Achenbach & Rescorla, 2001), Autism Diagnostic Interview-Revised (ADI-R) (Rutter, Le Couteur, & Lord, 2003) and the Vineland Adaptive Behavior Scales Interview Edition Survey Form (VABS) (Sparrow, Balla, & Cicchetti, 1984). The child session involved administration of the KBIT (Kaufman & Kaufman, 1990) and Peabody Picture Vocabulary Test-Third Edition (PPVT-III) (Dunn & Dunn, 1997).

The second session with the parent involved administration of a general questionnaire (approximately 20 mins) and at this time they were also given a verbal interpretation of the results from the IQ, adaptive behaviour and receptive vocabulary tests. The second session with the child involved administration of the Damon and Hart Self-Understanding Interview (Damon & Hart, 1988) and two false-belief theory of mind tasks (first and second-order theory of mind tasks).

5.3 Measurement instruments

The instruments completed by participants are listed in Table 5.1 and are described in detail from section 5.3.1.

Table 5.1 Instruments completed

Variable	Instrument
Behavioural and emotional problems	Child Behavior Checklist
ASD symptoms	Autism Diagnostic Interview-Revised
IQ	Kaufman Brief Intelligence Test
Adaptive behaviour (Social functioning)	Vineland Adaptive Behavior Scales
Receptive language	Peabody Picture Vocabulary Test Third Edition
Self-understanding	Damon & Hart Self-Understanding Interview
Theory of mind	First-order “Sally Anne” task Second-order “Ice Cream” task
Demographics	General Questionnaire

5.3.1 Child Behavior Checklist (CBCL)

The CBCL (Achenbach & Rescorla, 2001), is a standardised instrument of 118 items, that assesses competencies, adaptive functioning, and behaviour problems in children. The CBCL consisted of a form for children aged 18

months to five years, and a version for children aged six to 18 years. The CBCL/6-18 was completed by parents/ carers who saw the child in family-like contexts. The CBCL was employed to help screen out psychiatric conditions in the TD group. The first two pages requested demographic information, while the last two pages requested ratings of behavioural, emotional and social problems. The respondent rated each problem item as 0 = not true, 1 = somewhat or sometimes true, and 3 = very often or often true, based on the preceding six months.

The CBCL consisted of two broadband factors of behaviour problems: internalising and externalising, with mean scale scores for national normative samples and clinically referred and nonreferred samples of children. Internalising behaviours included anxiety/depression, withdrawal, and somatic complaints. Externalising behaviours included attention problems, aggressive behaviour, and rule-breaking actions. Behavioural scales yielded a score of total behavioural problems. Scores were summed and then converted to normalised T scores. For internal, external, and total behaviour problems, T scores >60 were within the borderline to clinical referral range. Higher scores represented more deviant behaviour.

The CBCL has been shown to have very high inter-interviewer reliability (.93 for the 20 competence items and .96 for the 118 specific problem items)

(Achenbach & Rescorla, 2001). This test had very high test-retest reliability (Achenbach & Rescorla, 2001). The overall intraclass correlation coefficient (ICC) was 1.00 for the 20 competence items and .95 for the 118 specific problem items (Achenbach & Rescorla, 2001). Internal consistency refers to the correlation between half of a scale's items and the other half of its items. The alphas for the competence scales were moderately high, ranging from .63 to .79. These alphas were about as high as can be expected for scales that have only a few items, and that were designed to tap a variety of competencies with items that differ in format (Achenbach & Rescorla, 2001). For the empirically based problem scales, the alphas ranged from .78 to .97, and for the DSM-oriented scales, the alphas ranged from .72 to .91 (Achenbach & Rescorla, 2001).

In relation to the stability of scale scores, over 12 and 24 months respectively, the mean correlations were .70 and .61 on the competence scales, .74 and .70 on the empirically based problem scales, and .65 and .68 on the DSM-oriented scales (Achenbach & Rescorla, 2001). The content validity of the competence, adaptive, and problem item scores has been supported by four decades of research, consultation, feedback, and revision, as well as by findings that all items discriminated significantly ($p < .01$) between demographically matched referred and nonreferred children (Achenbach & Rescorla, 2001). The criterion-related validity of the CBCL was supported by

multiple regressions, odds ratios, and discriminant analyses, all of which showed significant ($p < .01$) discrimination between referred and nonreferred children (Achenbach & Rescorla, 2001). The construct validity of the scales has been supported in many ways, such as evidence for significant associations with analogous scales of other instruments and with DSM-IV (American Psychiatric Association, 1994) criteria, by cross-cultural replications of ASEBA syndromes, by genetic and biochemical findings, and by predictions of long-term outcomes (Achenbach & Rescorla, 2001).

5.3.2 Autism Diagnostic Interview – Revised (ADI-R)

The ADI-R (Rutter et al., 2003) was administered to the parent/s of the participants in the ASD group. The ADI-R is a standardised, semi-structured diagnostic interview designed to elicit a full range of information needed to produce a diagnosis of autism and to assist in the assessment of related disorders, such as AD. The ADI-R is one of the “gold standard” diagnostic instruments in all appropriate autism research protocols (Filipek et al., 1999).

Use of the ADI-R involves an experienced clinical interviewer. In the current study the interviewer was a registered psychologist who completed specific training, having achieved competence in the use of the ADI-R for research purposes. In addition, the interviewer had previous experience in the assessment of, and intervention for, children with ASD. Use of the ADI-R also requires an informant (a parent or caregiver) who is familiar with both the

developmental history and the current day-to-day behaviour of the individual being assessed. In the current study the informant was in most instances the biological parent/s. The ADI-R is designed to be applicable across a wide age range (in terms of both mental age and chronological age) providing the participant's mental abilities are at a developmental level of at least two years.

The ADI-R takes approximately two hours to administer and score. It focuses on three main areas: (i) quality of reciprocal social interaction; (ii) communication and language; and (iii) repetitive, restricted and stereotyped patterns of behaviour. The ADI-R produces an algorithm consisting of 37 items organised according to *the International Classification of Disease Tenth Edition (ICD-10)* (World Health Organization, 1992a) and *DSM-IV* (American Psychiatric Association, 1994) diagnostic criteria for autism. There are no standard cut-offs on the ADI-R for AD, but the diagnostic algorithm has also been found to be almost as effective for AD as for autism when applied to school age children (Rutter et al., 2003) and several possible cut-offs have been proposed by different investigators (International Molecular Genetic Study of Autism Consortium, 2001; Sung et al., 2005).

The psychometric data for the ADI-R was carefully collected with attention to matching across samples and maintaining rater “blindness” (Lord, 1997). Reliability of the ADI-R has been assessed using measures of inter-rater reliability and test-retest reliability. Inter-rater reliability has been good to excellent for individual items and excellent for overall scores, including those for each of the three domains. In the study by Lord, Rutter et al. (1994) 26 of the 35 weighted kappa values for the behavioural items in the three domains were 0.70 or greater, and none was below 0.60. In the study by Poustka, Lisch et al. (1996), 27 out of 36 kappa values were 0.70 or greater, but six were below 0.60. Inter-rater reliabilities were substantially higher for summated ratings in the three domains and the multiple sub-domains. The intra-class correlations in the Lord et al. (1994) study ranged from 0.93 to 0.97. In the Poustka, Lisch et al. (1996) study the intra-class correlations ranged from 0.73 to 0.86, except for one at 0.69, another at 0.66, and a third at 0.52. Inter-rater reliability has been assessed by Chakrabarti and Fombonne (2001) and the intra-class correlation coefficients ranged from 0.59 to 0.87. Internal consistency was excellent within the three domains. Differentiation between children and adults with autism and those with intellectual disability is excellent (Lord, Storoschuk, Rutter, & Pickles, 1993).

Data on test-retest reliability were obtained in the Lord, Storoschuk et al. (1993) study. Retest reliability was very high, all coefficients being in the

range of 0.93 to 0.97. Hill, Bolte et al. (2001) showed inter-rater reliabilities slightly below those reported by Lord, Storoschuk et al. (1993). Lord, Rutter et al. (1994) reported kappa values ranging from 0.74 to 0.82. The re-test reliabilities were high ranging from 0.82 to 0.91.

Validity of the ADI-R was assessed using measures of discriminative validity and convergent validity. Data on the discriminative validity were obtained in the Lord, Rutter et al. study (1994). The validation findings indicated good diagnostic differentiation of the overall algorithm (the social domain showing the most clear-cut diagnostic differentiation), but they confirmed the difficulties associated with diagnosis in young non-verbal children with low mental ages. The findings from all the studies to date indicated that the ADI-R diagnostic algorithm worked well for the differentiation of ASD from non-autistic developmental disorders in clinically referred groups provided the mental age is above 2 years.

In terms of convergent validity, when the ADI-R has been compared with the Childhood Autism Rating Scale (CARS) (Schopler, Reichler, De Vellis, & Daly, 1980) it has been found to have excellent convergent validity after age 3 years (Lord, 1997); convergent validity with the Autism Diagnostic Observation Schedule (ADOS) has also been good (Le Couteur et al., 1989).

5.3.3 Vineland Adaptive Behavior Scales Interview Edition Survey Form (VABS)

The VABS (Sparrow et al., 1984) were used to assess adaptive behaviour. The VABS includes 297 items and evaluates personal and social sufficiency in individuals aged between 0 through to 18 years 11 months, or a low-functioning adult. The scales consist of semi-structured interviews conducted with a carer who is familiar with the day-to-day activities of the participant, and takes 20 to 60 minutes to administer. The instrument assesses four areas of adaptive behaviour: Communication, Daily Living Skills, Socialization and Motor Skills. Communication refers to those skills required for receptive, expressive, and written language; Daily Living Skills includes the practical skills needed to take care of oneself and contribute to a household and community; Socialization pertains to those skills needed to get along with others, regulate emotions and behaviour, as well as skills involved in leisure activities such as play; Motor Skills comprise both fine and gross motor skills, and are typically assessed in individuals below the age of 6 years. Therefore, in the current study they were not assessed.

The VABS is a preferred measure of adaptive behaviour for individuals with ASD because there are published supplementary norms specifically for individuals diagnosed with ASD (Carter, Volkmar, Sparrow, Wang, & Lord, 1998). In this study, the Socialization domain from the Interview Edition was

used to assess social skills. The Socialization domain can be used separately to assess social skills specifically (Njardvik, Matson, & Cherry, 1999) and has been shown to effectively document delays in social development in people diagnosed with ASD (Volkmar, Carter, Sparrow, & Cicchetti, 1993). The Socialization domain of the VABS has been shown to have good reliability (0.80) (Sparrow et al., 1984).

As with other standardised psychometric tests, a composite score is achieved. The composite score and each of the domain scores can be expressed as a standard score, which has an average standard score of 100, and standard deviations of 15.

Reliability of the VABS has been assessed using measures of internal consistency reliability, test-retest reliability and inter-rater reliability. For the Survey Form, the split-half reliability coefficients for the Communication domain range from 0.73 to 0.94, the Daily Living Skills domain coefficients range from 0.83 to 0.92, and the Socialization domain coefficients range from 0.78 to 0.94 (Sparrow et al., 1984). Generally, domain internal consistency reliability coefficients are satisfactory for the interpretation of individual performance. The split-half reliability coefficients for the Adaptive Behavior Composite are excellent, ranging from 0.89 to 0.98 (Sparrow et al., 1984). The test-retest reliability coefficients for the domains and Adaptive Behavior

Composite are very good, with the majority of the coefficients 0.80 and above (Sparrow et al., 1984). The interrater reliability coefficients for the Survey Form are quite good with majority above 0.70 (Sparrow et al., 1984).

Validity of the VABS was assessed using measures of construct validity, content validity, and criterion-related validity. Construct validity data are presented in terms of developmental progressions of Vineland scores, and factor analyses of the domains and sub-domains. The progression of mean raw scores from one age to the next provides adequate support for the assumption that adaptive behaviour as measured by the Vineland is age-related (Sparrow et al., 1984). In addition, results of the factor analyses indicate that the Adaptive Behavior Composite is an adequate index. The content validity of the Vineland is supported by the thorough procedures including field testing and national standardisation used in the original development of items (Sparrow et al., 1984). The validity of the VABS is also supported by correlations between Vineland scores and scores from other adaptive behaviour scales and intelligence tests (Sparrow et al., 1984).

5.3.4 Kaufman Brief Intelligence Test (KBIT)

The KBIT (Kaufman & Kaufman, 1990) is a brief, individually administered measure of the verbal and non-verbal intelligence of a wide range of children, adolescents and adults. It may be used for individuals aged between four

and 90 years. As with all other instruments in this study, the KBIT was administered by a trained psychologist.

The full test takes approximately 15 to 30 minutes to administer, and is composed of two sub-tests: Vocabulary (including expressive vocabulary and definitions) and Matrices. Vocabulary measures verbal crystallised thinking, based on school-related skills. The Matrices sub-test measures non-verbal skills and the ability to solve new problems (fluid thinking) by assessing an individual's ability to perceive relationships and complete analogies. All Matrices items involve pictures or abstract designs rather than words.

Age-based standard scores (SS) having a mean of 100 and a standard deviation of 15 are provided for the Vocabulary and Matrices sections, as well as an overall score, the KBIT IQ Composite. Reliability of the KBIT has been assessed using measures of internal consistency reliability, split-half reliability and test-retest reliability (Kaufman & Kaufman, 1990). Internal consistency reliabilities average 0.94 for the overall KBIT IQ Composite, 0.93 for the Vocabulary sub-test, and 0.88 for the Matrices sub-test (Kaufman & Kaufman, 1990). Split-half reliability figures for the Composite IQ score range from .88 to .98 (Kaufman & Kaufman, 1990). Test-retest reliability figures for Vocabulary coefficients range from .86 to .97, Matrices scores range from .80 to .92 and Composite scores all exceed .90 (Kaufman & Kaufman, 1990).

Validity of the KBIT was assessed using measures of concurrent validity, content validity and construct validity (Kaufman & Kaufman, 1990). Concurrent validity analyses with the Wechsler Intelligence Scale for Children—Third Edition (WISC-III) (Wechsler, 1991), Wechsler Adult Intelligence Scale- Revised (WAIS-R) (Wechsler, 1981) and Kaufman Assessment Battery for Children (KABC) (Kaufman & Kaufman, 1983) provide evidence that the KBIT subscales measure the same constructs as the KABC and Wechsler scales (Kaufman & Kaufman, 1990). In a study comparing the KBIT and WAIS-R correlations between the Verbal, Nonverbal and Composite scales of the two measures were .83, .77, and .88, respectively (Naugle, Chelune and Tucker, 1993). In another study, the WISC-III was compared to the KBIT to determine if the KBIT can reliably predict results for school aged children on the WISC-III (Boyd and Dumont, 1996). The results indicated strong correlations, the KBIT Vocabulary score correlated well with the WISC-III Verbal IQ score (.82) and there was strong correlation (.83) between the KBIT Composite score and the WISC-III Full Scale IQ score (Boyd and Dumont, 1996). Similarly, results from a study comparing the KBIT to the KABC indicated that the measures provide similar scores (Lassiter and Bardos, 2006).

A brief measure of intelligence was preferred for the current study because it allowed for other important variables to be assessed, and in addition

accommodated the large sample size and short attention spans, as well as minimising lethargy in the young participants.

The KBIT had the advantage of allowing information to be processed visually. For example, all the Matrices items contain pictures and abstract designs rather than words; therefore, non-verbal ability can be assessed even when comprehension and language skills are limited. In addition, most of the participants had previously been assessed using the Wechsler Scales of intelligence and therefore the KBIT prevented practice effects and served as a confirmation of the intellectual status of each participant.

5.3.5 Peabody Picture Vocabulary Test (PPVT-III)

Clinical observations and research suggest that children with ASD have difficulties with comprehension (Beisler, Tsai, & Vonk, 1987). These difficulties need to be taken into account when interviewing people with ASD.

In the present study the participants with an ASD were compared with young TD males and were all screened for a minimum verbal mental age of six years using the PPVT-III (Dunn & Dunn, 1997). The PPVT-III does not provide a comprehensive measure of all aspects of linguistic understanding, but it has proved useful in a number of studies for establishing comparison groups of individuals with ASD and TD groups who display similar levels of

performance (although sometimes contrasting profiles) on language related tasks (Silliman et al., 2003; Peterson et al., 2007). It therefore was deemed to be an appropriate measure of verbal ability.

The PPVT-III (Dunn & Dunn, 1997) is designed for persons aged two years, six months through to 90+ years and serves two purposes: (1) as an achievement test of receptive vocabulary attainment; and (2) as a screening test of verbal ability. The PPVT-III is individually administered and is available in two parallel forms, each containing four training items and 204 test items grouped into 17 sets of 12 items each. The item sets are arranged in order of increasing difficulty. Each item consists of four black and white illustrations arranged on a page. The PPVT-III testing time averages 12 minutes because most individuals complete five sets or 60 items of appropriate difficulty. Item sets that are too easy or too hard are not administered. Most of the scoring, which is rapid and objective, is accomplished while the test is being administered.

Performance on the PPVT-III (Dunn & Dunn, 1997) has been compared with performance on other measures of verbal ability. The studies of Rutter and his colleagues (Bartak, Rutter, & Cox, 1975; Lockyer & Rutter, 1970) indicate how performance on Picture Vocabulary tests compares with the verbal subtests of the Wechsler Scales of Intelligence in revealing troughs in the abilities

of people with autism. Further, the PPVT-III and the Wechsler Intelligence Scale for Children-Third Edition (WISC-III) (Wechsler, 1991) correlate highly with verbal IQ scores and provide strong evidence that the PPVT-III is an effective screening device for verbal ability.

The PPVT-III (Dunn & Dunn, 1997) was standardised in the United States on a national stratified sample of 2,725 persons, 2,000 children and adolescents, and 725 persons over age 19. Raw scores can be converted to the following age-referenced normative scores: standard scores, percentiles, stanines, normal curve equivalents and age equivalents. Optional bands of confidence for these derived scores are also provided.

The psychometric properties of the PPVT-III (Dunn & Dunn, 1997) include four types of reliability: alpha reliability, split half reliability, alternate forms reliability and test-retest reliability. Alpha reliability coefficients ranged from 0.92 to 0.98 with a median value of 0.95 for both form IIA and IIB. Split-half reliability coefficients ranged from 0.86 to 0.97 with a median reliability of 0.94 for both form IIA and form IIB. Alternate forms reliability coefficients ranged from 0.88 to 0.96 with a median value of 0.94. Test-retest reliability coefficients were in the 0.90s (Dunn & Dunn, 1997).

Four types of validity have been computed for the PPVT-III (Dunn & Dunn, 1997) including construct validity, content validity, internal validity and criterion validity. With regards to content validity, there is strong evidence that the PPVT-III measures what it claims to measure when that is defined as hearing vocabulary for single standard English words. When an inference is made that the test can be used as a screening test of intellectual functioning, arguments to support the claim must be based on construct validity. There is substantial evidence to conclude that a test of vocabulary such as the PPVT-III predicts school success and taps verbal ability quite well. There is also necessary evidence to support internal validity and criterion validity of the PPVT-III. Four criterion validity studies were conducted during standardisation of the PPVT-III, and all results provided evidence that PPVT-III is an effective screening device for verbal ability (Dunn & Dunn, 1997).

In the present study the PPVT-III (Dunn & Dunn, 1997) served the purpose of a measure of verbal mental age. As previously mentioned, no individual with autism having a verbal mental age (VMA) of less than six years or chronological age of eight years has been recorded as passing any theory of mind task (Kleinman et al., 2001). Therefore, only those with a VMA above six years were included in the present study. The PPVT-III can be used successfully with persons who have been diagnosed with ASD because there is no need for them to speak or interact verbally with the examiner (Dunn & Dunn, 1997).

5.3.6 Damon and Hart's Self-Understanding Interview

Damon and Hart's Self-Understanding Interview (Damon & Hart, 1988) is a structured interview method that gathers in-depth information about a person's knowledge of self. The interview questions specifically target self-descriptions ("What are you like?") rather than self-evaluations which require participants to react to statements in the form of judgements ("I am good at sport"). The Damon and Hart Self-Understanding Interview (Damon & Hart, 1988) attempts to incorporate the voices of individuals, their self-descriptions, perspectives and concerns and was selected not only because it was designed for children, but also because it is the most sensitive approach to evaluating those aspects of self-understanding that were predicted to be relatively improvised in individuals with high-functioning ASD, namely the social and psychological, as well as those aspects anticipated to be relatively robust, namely the physical and active aspects. Therefore, it held promise for demonstrating specificity in any group differences observed in spontaneously generated and verbally expressed self-statements. There has been no research located on the psychometric properties of the Damon and Hart Self-Understanding Interview (Damon & Hart, 1988), however, the researcher followed the standardised procedure for administration and scoring and the interview has been successfully used in previous research on young people with intellectual disabilities and ASD (Lee & Hobson, 1998; Mavropoulou, 1995; Yoshii & Yoshimatsu, 2003).

The Damon and Hart's Self-Understanding Interview (Damon & Hart, 1988) contains seven principal items. The first four items were designed to explore the self-as-object and the last three the self-as-subject. These were presented in a fixed order with occasional variation to maintain the flow of the interview.

The wording of the questions was varied as required, to suit each participant's comprehension needs. The interview also allows, where necessary, new probe questions to be added in order to fully explicate each participant's line of reasoning. The general principle in probing a self-statement is to continue with follow up questions until the participant repeats himself, gives an "I don't know" response, or shows marked signs of tiredness. Each interview took between 30 and 60 minutes to administer.

Scoring the Self-Understanding Interview

All interviews were transcribed verbatim. Each transcript was divided into units of scoring called "chunks". A chunk were defined as a self-characteristic mentioned by the participant, together with responses to the related probe questions, as well as any further discussion of the specific characteristic that immediately followed the probed responses. Chunks were derived from self-statements elicited in the course of the self-understanding interview and

coded into those that demonstrated an awareness of the self-as-subject and those that demonstrated an awareness of the self-as-object. These two classes of self-awareness were considered separately. Within the self-as-subject, chunks were coded into one of three categories (Continuity, Agency and Distinctness) and then at one of four levels (Levels of description). Within, the self-as-object chunks were coded into one of the four categories of self-understanding (Physical, Active, Social and Psychological) then rated at one of four levels (Levels of description), based on Damon and Hart's (1988) coding scheme and scoring criteria.

Damon and Hart (1988) included the following additional rules for scoring identified chunks: (a) a chunk that can be coded at more than one level within a single category should be scored at the highest applicable level in that category; (b) a chunk that can be coded in two or more categories at different levels should be scored for the highest level in the various categories. All categories can be defined in conjunction with all of the levels. For example, a physical statement would have a level three assignment if a physical feature was discussed in regard to how it impacted one's social appeal; or a psychological rating would have a level one assignment if the statement focussed only on "moods, thoughts, feelings unrelated to permanent dispositions, abilities or beliefs" (Damon & Hart, 1988).

For reliability purposes, a third person was trained to identify self-statements according to the criteria outlined above. The rater, blind to the diagnosis, identified all chunks from two transcripts (one from the ASD sample and one from the non-ASD sample). Of the 40 chunks identified by the investigator from these two transcripts, 38 (95%) were identified by the blind rater. Furthermore, the blind rater did not identify a single chunk within the two transcripts which was not already identified by the investigator. Following this the same rater was trained to code chunks using the Damon and Hart scoring manual. The same rater then coded all of the chunks identified by the investigator for 16 (20%) randomly selected participants (eight with ASD and eight TD participants). Intraclass Correlation Coefficient (ICC) was calculated. The two raters achieved high proportions of agreement for *category* (ICC = 0.84), and *level* (ICC = 0.81).

In addition to the coding method presented above, the investigator carried out supplementary analysis and coded the presence or absence of recurring themes in participants' responses to three questions: What are you most proud of?; If you could have three wishes what would they be?; and How did you get to be the way you are? These questions were chosen because they provided opportunities to capture aspects of the self that reflect specific choices, self-evaluations and reflection on their own agency and development. In addition, the researcher examined responses to identify all

references by the ASD participants to their own disorder. These references were coded according to whether they discussed their disorder in a positive, neutral or negative way.

5.3.7 Theory of mind measures

A common approach to assessing theory of mind is the ability to attain false-belief understanding, the understanding that others hold a belief whose content contradicts reality (Wellman et al., 2001). False-belief understanding is typically measured by social-cognitive tasks that relate to the understanding that different people have different thoughts or beliefs about the same situation. In everyday life, there are many examples that involve understanding that another person may have a belief that is different from reality. For example, interactions that involve teasing, reflecting an awareness of another person's mistaken expectation, negotiating friendships by reading and responding to intentions, in conversations reading the listener's level of interest in one's speech and being able to anticipate what other's might think of ones actions (Howlin, Baron-Cohen, & Hadwin, 1999; Reddy, 1991).

False-belief tests were chosen for this study because the ability to attribute false-beliefs is considered an important milestone in the development of ToM and they are commonly used in research on children with ASD (Astington &

Gopnik, 1991). The standard approach to the assessment of false-beliefs involves first and second-order tasks. Performance on first and second-order false-belief tasks correlate with other measures of person perception. For example, Happe (1993) found first and second-order false-belief performance correlated with the understanding of metaphor and irony. Similarly, Hillier et al (2002) found a significant relationship between scores from first and second-order false-belief tasks and understanding complex emotions (such as embarrassment) in others.

Participant's understanding of first-order false-beliefs was assessed using the traditional "Sally Anne task", a task based on one developed by Wimmer and Perner (1983) and was similar to that used by Baron-Cohen et al., (1985). Participant understanding of higher order mental state reasoning was assessed using Baron-Cohen's (1989b) "Ice Cream task", a task originally developed by Perner and Wimmer (1985). The "Sally Anne task" and "Ice Cream task" were selected because they could be presented visually (i.e. participants were asked to watch a scene acted out using dolls) which facilitated participant understanding. In addition, the two tasks were straightforward and efficient to administer, important features given the large battery of tests and the limited time available with each participant.

Before administration began, the examiner read a brief set of instructions, including a simplified purpose of the task. Participants were told that they were to help the examiner decide whether or not little children would like the stories and why. This purpose was included because research indicates that more complex narratives result when children are provided with a shared purpose for the activity (Bamberg & Reilly, 1996). After describing the purpose to the participants, the examiner began administration of the first-order task.

5.3.7.1 First-order false-belief task: “Sally Anne task”

The task employed two dolls, a basket, a box and a marble. The experimenter and the participant were sitting at a table, facing each other. To facilitate comprehension, participants were also presented with a written version of the story and a written version of all questions.

Each participant was presented with two doll protagonists (Sally and Anne). Explanations were given: “This is Sally. This is Anne. Sally has a basket. Anne has a box”. Participants were tested to ensure they knew which doll was which: “Which is Anne? Which is Sally?” (Naming Question). Next, the experimenter moved the doll Sally in a way that she placed the marble in her basket. The experimenter explained, “Sally is going outside for a walk” and the doll Sally left the scene. Next, the experimenter moved the doll Anne in a

way that she took the marble out of Sally's basket and hid it in her box. At this point, two prompt questions were asked, "Where did Anne hide the marble?" and "Did Sally see that?" Then, when Sally returned, the experimenter asked the critical belief question: "Where will Sally look for her marble?" The participant could either say or point to the location where he thought that Sally would look for the marble. If the young person pointed or verbally indicated to the previous location of the marble, then they passed the Belief Question by appreciating the doll's now false-belief. If, however, they pointed to the marble's current location, then they failed the question by not taking into account the doll's belief. The participant was asked to justify his response (Justification Question). Lastly, two control questions were asked: "Where is the marble really?" (Reality Question) and "Where was the marble in the beginning?" (Memory Question). The control questions were crucial to ensure that the participant had both knowledge of the real current location of the object and an accurate memory of the previous location.

Response Coding

Participants received a pass (correct) only if they answered the test question correctly. Participants received a fail (incorrect) if they answered the false-belief test question incorrectly.

5.3.7.2 Second-order false-belief task: “Ice Cream task”

The task employed four dolls, a model village (including two houses, a school and a park) and an ice cream van constructed from cardboard. The experimenter and the participant were sitting at a table facing each other. To facilitate comprehension, participants were presented with a written version of the story and a written version of all questions. Before reading/hearing the story, each participant was shown the display, the key locations were named and the characters (John, Mary, the ice cream man and Mary’s mother) were introduced. Participants were tested to ensure they knew which actor doll was which, by being asked: “Which is John and which is Mary?” (Naming Question). The experimenter presented the story verbatim and enacted the events. The story line was based around two actors, John and Mary, who see an ice cream van at the park where they were playing. Later, each actor was independently informed that the ice cream van had moved from the park to the school, but neither knew that the other actor was informed. The purpose of the probe questions was to ensure that the participants were following the story and had correctly encoded and remembered the key events. The purpose of the control questions was to assess the participants’ understanding of first-order knowledge or ignorance (e.g., “Does Mary know where the ice cream van is?”). Across the probe and control questions the number of “yes” and “no” responses was balanced to ensure that participants did not receive a bias in favour of one response over another. After each

probe and control question was answered, feedback or correction was provided to the participant. Finally, there were two test questions for which no feedback was provided: the second-order ignorance question and the second-order false-belief question. These were asked as open-ended questions. To respond correctly, participants had to take into account John's ignorance of Mary's knowledge of the true whereabouts of the ice-cream van (i.e. "John thinks that Mary thinks that . . ."). However, if the participant gave no response, then a forced-choice format was used (e.g. "Does John know that Mary knows where the ice cream man is?" or "Does John not know that Mary knows where the ice cream man is?"). The presentation order of the forced choice response was reversed across participants. Before the second-order false-belief test question, participants were provided with a memory question to ensure that the participants were following the story and had correctly encoded and remembered the key events.

Response Coding

Participants received a pass (correct) only if they answered the test question correctly. Participants received a fail (incorrect) if they answered the false-belief test question incorrectly. Justifications were coded as either pass or fail. A pass is where two mental states are mentioned (e.g. "John thinks that Mary thinks . . ."). A fail was given when one or less mental states were mentioned (e.g. John thinks she is at the park, or she is at the park).

5.3.8 General Questionnaire

A general questionnaire (see Appendix C) was administered to parents. The questionnaire included questions about demographic information about the participant (for example, place of residence, family structure and socio-economic status). Socio-economic status was measured using the Hollingshead Index of Social Position (Hollingshead, 1957). The Hollingshead Index of Social Position is designed to measure social class, conceptualised as a weighted combination of residential address, occupational position and educational attainment. The index ranks people on a 5-point social class scale, using self-report data on occupational category and years of education. In addition, information was gathered about the participant's medical history (including other medical problems and medication usage) and interventions (for example, education and participation in social skills groups).

5.4 Participant motivation

The motivation of participants was a methodological issue for completion of the Self-Understanding Interview. Koegel and Mentis (1985) have addressed the issue of motivation in children with autism and in their work reported a study that compared the impact of two reinforcement contingencies on the verbal responding of four children with autism. They found that when any observable attempt to verbalise was reinforced rather than reinforcement of

specific verbalisations all children achieved higher rates of correct verbal responding and progressed more rapidly.

Vismara (2006) addressed the role of motivation in children with autism, by examining whether using motivational procedures (such as integrating participants' interests into intervention sessions) improved joint attention in children with autism. Vismara (2006) found improvements in participants' joint attention, communicative behaviours, and the quality of interactions with caregivers as a result of motivational procedures.

Before commencing the self-understanding interviews the investigator made attempts to get to know the participants and therefore built up a rapport with them. The self-understanding interviews were paced according to the participants' needs and routine, and accommodations were made for fatigue. Therefore, steps were taken to ensure that the responses provided by the participants reflected their understanding of self.

5.5 Statistics

Data were analysed using SPSS 14 for Windows (2005). A p value of < 0.05 was considered to be statistically significant for all analyses. The strength of a bivariate correlation was recorded as small when the r value was 0.20-0.29, moderate when the r value was 0.30-0.49, and large when the r value was

0.50-1.00. This partitioning of the strength of correlation coefficients followed Cohen (1988), except that correlations of 0.10-0.19 were not included in the small category for clarity of presentation. The p values for the bivariate correlations are recorded in the tables, but they are not referred to in the text because the statistical significance of r is strongly influenced by sample size (Cohen, 1988).

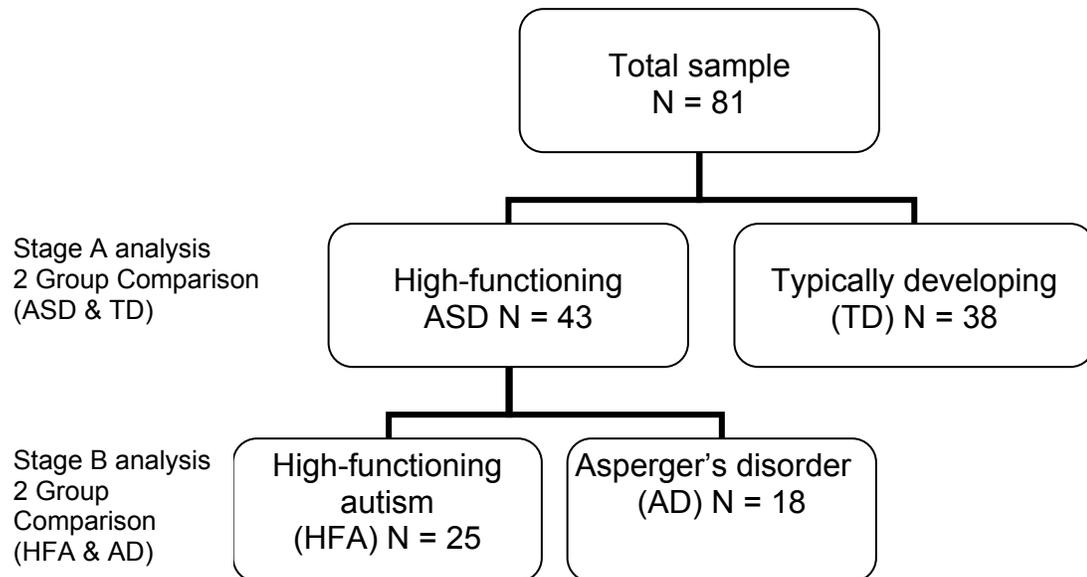
To compare groups, parametric and non-parametric statistics were used. Parametric techniques (for example, t-test and Pearson Correlation) were used when the underlying distribution of scores in the groups were normal. Non-parametric techniques (for example, Chi-square, Spearman Rank Order Correlation and Mann-Whitney) were used when parametric assumptions were not met. A Fisher's Exact Test was selected when one or more cells in a 2 x 2 contingency table had an expected count less than 5. Adjustments for multiple comparisons were made using multiple regression analysis.

Normal distribution was assessed by various measures. The first was assessing the proximity of the mean to the median. Second, skewness and kurtosis values were examined. Finally, statistical tests of normality were obtained. The Shapiro-Wilk test statistic was used to determine normality.

5.6 Study design

The design of the research is schematically presented in Figure 2

Figure 2: Nomothetic research design



Targeted measures

1. Damon and Hart's Self-Understanding Interview
2. Socialization Domain (Vineland Adaptive Behavior Scales)
3. Two False-Belief Theory of Mind tasks:
First-Order Sally-Anne Task
Second-Order Ice Cream Task

Chapter 6

Results

Part I: Participant Characteristics

The sample consisted of 43 young males diagnosed with one of the autism spectrum disorders (ASD) and 38 typically developing (TD) young males. The ASD group consisted of 25 participants diagnosed with high-functioning autism (HFA) whilst 18 were diagnosed with Asperger's disorder (AD).

Age: The age of the participants ranged from 9-18 years old, with a mean age of 12.43 (ASD: mean = 11.93, SD = 2.60; TD: mean = 13.00, SD = 2.14). An independent samples t-test showed a borderline significant difference between the two groups for age ($t(78.6) = -2.03, p = 0.05$); the mean age for the ASD group was one year lower than the TD group.

Education level: In the total sample, 37% (30) of participants were in primary school, and 63% (51) were in secondary school or no longer at school. In the ASD group, 48.8% (21) were in primary school, and 51.2% (22) were in secondary school or no longer at school. In the TD group, 23.7% (9) were in primary school and 76.3% (29) were in secondary school or no longer at school. Yates' Correction for Continuity chi-square analysis showed

that participants in the ASD group were significantly more likely to be in primary school than those in the TD group: χ^2 (df = 1, N = 81) = 4.45, $p = 0.04$.

Education support: In the total sample, 43.2% (35) received special education support (for example, access to a teacher's aide) and 56.8% (46) received no special education support. In the ASD group, 76.7% (33) received special education support, and 23.3% (10) received no special education support. In the TD group, 5.3% (2) received special education support and 94.7% received no special education support. Yates' Correction for Continuity chi-square analysis showed that participants in the ASD group were significantly more likely to receive special education support than those in the TD group: χ^2 (df = 1, N = 81) = 39.14, $p = < 0.0001$.

Indigenous background: Of the ASD group, 2.3% (1) was indigenous and 97.7% (42) were non-indigenous. Of the TD group, 2.6% (1) were indigenous Australians and 97.4% (37) were non-indigenous. Fisher's Exact Test chi-square analysis showed no significant difference on this variable between the ASD and TD groups ($p = 1.00$).

Socio-economic status: In the total sample, 23.5% (19) of the participants were from upper or upper-middle class socio-economic backgrounds, 61.7% (50) were from middle class backgrounds, and 14.8% (12) were from lower-middle or lower socio-economic backgrounds as determined by the Hollingshead Index of Social Position (Hollingshead, 1957). Of the ASD group, 16.3% (7) were from upper or upper-middle class, 65.1% (28) were from middle class, and 18.6% (8) were from lower-middle or lower class backgrounds. Of the TD group, 31.6% (12) were from upper or upper-middle class, 57.9% (22) were from middle class, and 10.5% (4) were from lower-middle or lower class backgrounds. Pearson's chi-square analysis showed no significant difference between the ASD and TD groups; χ^2 (df = 2, N = 81) = 3.07, p = 0.22.

Residence: Participants were from New South Wales (NSW) and Australian Capital Territory (ACT). In the total sample, 80.2% (65) participants lived in urban areas and 19.8% (16) lived in rural areas. Of the ASD group, 69.8% (30) of the participants lived in urban areas and 30.2% (13) lived in rural areas. Of the TD group, 92.1% (35) of the participants lived in urban areas and 7.9% (3) lived in rural areas. Yates' Correction for Continuity chi-square analysis showed that the residence of the ASD group differed from the TD

group. Significantly fewer participants from the TD group lived in rural areas; χ^2 (df = 1, N = 81) = 5.02, p = 0.03.

Parents: The majority of participants in the total sample (95.1%) were the natural (or biological) children of their parents and 4.9% (4) were adopted or fostered. In the ASD group 93.0% (40) were natural children of their parents and 7% (3) were adopted or fostered. In the TD group 97.4% (37) were natural children and 2.6% (1) were adopted or fostered. Fisher's Exact Test chi-square analysis showed no significant difference between the ASD and TD groups (p = 0.62).

Family: In the ASD group 69.8% (30) lived with both parents and 30.2% (13) lived with one parent. In the TD group 76.3% (29) lived with both parents and 23.7% (9) lived with one parent. Yates' Correction for Continuity chi-square analysis showed no significant difference in the number of participants living with both parents in the ASD and the TD groups; χ^2 (df = 1, N = 81) = 0.17, p = 0.68.

Siblings: In the ASD group 86.0% (37) lived with one or more siblings and 14.0% (6) lived with no siblings. In the TD group 94.7% (36) lived with one or more siblings and 5.3% (2) lived with no siblings. Fisher's Exact Test chi-

square analysis showed no significant difference in the number of participants living with siblings in the ASD and TD groups ($p = 0.27$).

Intelligence quotient (IQ): The IQ of participants ranged from 73 to 134, with a mean IQ of 105.77 (see Table 6.1). An independent samples t-test was conducted to determine whether the two groups differed on IQ as assessed on the KBIT (see Table 6.2). No significant difference was reported with respect to IQ standard score ($t(76.37) = -0.75, p = 0.46$). Furthermore, there was no significant difference between the two groups in regard to verbal IQ ($t(79) = 0.24, p = 0.81$) and performance IQ ($t(79) = -1.64, p = 0.11$).

Adaptive behaviour: The adaptive behaviour score for participants ranged from 39 to 126, with a mean of 84.96 (see Table 6.1). An independent samples t-test was used to determine whether the two groups differed on adaptive behaviour (see Table 6.2). There was a significance difference between the two groups on the composite adaptive behaviour standard score. The ASD group (mean = 72.16, SD = 19.87) scored significantly lower than the TD group (mean = 99.45, SD = 12.10); ($t(70.53) = -7.56, p = < 0.0001$). Independent samples t-tests were conducted to determine whether the two groups differed on each of the sub-domains of Communication (ASD: mean = 82.44, SD = 25.98; TD: mean = 100.37, SD = 11.84); ($t(60.28) = -4.07, p = < 0.0001$), Daily living skills (ASD: mean = 72.35, SD = 22.95; TD = 93.00, SD

= 10.88; ($t(61.54) = -5.27, p = <0.0001$), and Socialization (ASD: mean = 73.37, SD = 16.45; TD: mean = 105.13, SD = 13.01); ($t(78.09) = -9.69, p = <0.0001$).

Receptive language: The receptive language ability results on the PPVT-III of participants ranged from 72 to 138, with a mean value of 107.89 (see Table 6.1). An independent samples t-test showed no significant difference between the ASD (mean = 105.07, SD = 17.45) and TD groups (mean = 111.08, SD = 9.47) with respect to the PPVT-III standard score ($t(66.31) = -1.96, p = 0.06$), although the difference between the groups approached significance.

Table 6.1 IQ, Adaptive Behaviour and Receptive Language: Means and Standard Deviations for the total sample.

Standard Score (SS)	N	Minimum	Maximum	Mean	SD
KBIT					
Vocabulary	81	70	128	103.79	13.08
Matrices	81	75	134	106.63	13.20
KBIT Composite Standard Score	81	73	134	105.77	12.97
VABS					
Communication	81	36	123	90.85	22.37
Daily living skills	81	20	129	82.04	20.95
Socialization	81	49	127	88.27	21.79
Adaptive Behavior Composite Standard Score	81	39	126	84.96	21.51
PPVT-III					
PPVT-III Standard Score	81	72	138	107.89	14.51

Table 6.2 IQ, Adaptive Behaviour and Receptive Language: Means and Standard Deviations of the ASD and TD groups.

Variable	ASD Mean (SD)	TD Mean (SD)	T or x	Df	P
Age	11.93 (2.60)	13.00 (2.14)	-2.03	78.6	0.05
KBIT					
Vocabulary	104.12 (14.18)	103.42 (11.90)	0.24	79.0	0.81
Matrices	104.40 (14.32)	109.16 (11.47)	-1.64	79.0	0.11
KBIT Composite Standard Score	104.77 (14.72)	106.89 (10.74)	-0.75	76.4	0.46
VABS					
Communication	82.44 (25.98)	100.37 (11.84)	-4.07	60.3	< 0.0001**
Daily living skills	72.35 (22.95)	93.00 (10.88)	-5.27	61.5	< 0.0001**
Socialization	73.37 (16.45)	105.13 (13.01)	-9.69	78.1	< 0.0001**
Adaptive Behavior Composite Standard Score	72.16 (19.87)	99.45 (12.10)	-7.56	70.5	< 0.0001**
PPVT-III					
PPVT-III Standard Score	105.07 (17.45)	111.08 (9.47)	-1.96	66.3	0.06

*Significant at the < 0.05 level

**Significant at the < 0.01 level

Social skills training: None of the participants in the TD group had participated in a social skills training program. In the ASD group 27.9% (12) had participated in one or more social skills training programs but 72.1% (31) had not. Yates' Correction for Continuity chi-square analysis showed that the

proportion of participants in the ASD group who had participated in at least one social skills training program was significantly higher than in the TD group: χ^2 (df = 1, N = 81) = 10.34, $p = < 0.0001$.

Medication: One of the participants in the TD group was taking medication. In the ASD group 34.9% (15) were taking medication and 65.1% (28) were not taking medication. Yates' Correction for Continuity chi-square analysis showed that the number of participants in the ASD group who were taking medication significantly differed from the number of participants in the TD group: χ^2 (df = 1, N = 81) = 11.28, $p = < 0.0001$. Of the ASD group, 20.9% (9) were taking stimulants, 18.6% (8) were taking anti-depressant medication, 14.0% (6) were taking anti-psychotics, 7.0% (3) were taking anti-convulsants and 2.3% (1) were taking anxiolytic medication. The one medicated participant in the TD group was taking an anti-depressant.

Part II: Participant Characteristics of the ASD Groups

As noted in Part I, the ASD group consisted of 43 young males diagnosed with one of the ASD. Of these participants 25 were diagnosed with high-functioning autism (HFA) and 18 were diagnosed with Asperger's disorder (AD).

Age: The age of the participants in both groups ranged from 9 to 17 years. The mean age for the HFA group was 11.48 (SD = 2.57) and the mean age for the AD group was 12.56 (SD = 2.60). An independent samples t-test showed no significant difference between the mean age of the two groups (see table 6.3) ($t(41) = -1.35, p = 0.19$).

Education support: Of the HFA group 88.0% (22) had received special education support compared to 61.1% (11) from the AD group. Yates' Correction for Continuity chi-square analysis showed no significant difference between the HFA and AD groups for special education support: $\chi^2(df = 1, N = 41) = 2.87, p = 0.09$).

Intelligence quotient: The IQ of participants in the HFA group ranged from 73 to 134 (mean = 102.68; SD = 15.90) and the AD group ranged from 87 to

130 (mean = 107.67; SD = 12.77). An independent samples t-test showed no significant between the groups for mean IQ ($t(41) = -1.10, p = 0.28$). Furthermore, there was no significant difference between the two groups in regard to mean verbal IQ ($t(41) = -1.30, p = 0.20$) and mean performance IQ ($t(41) = -0.62, p = 0.54$) (see Table 6.3).

The cognitive profiles of the HFA and AD groups were examined. Paired-samples t-tests showed no significant difference between mean verbal IQ (mean = 101.76, SD = 14.67) and mean performance IQ (mean = 103.24, in the HFA group ($t(24) = -0.61, p = 0.55$). For the AD group, there was no significant difference between mean verbal IQ (mean = 107.39, SD = 13.16) and mean performance IQ (mean = 106.00, SD = 12.29), ($t(17) = 0.50, p = 0.62$).

Adaptive behaviour: The adaptive behaviour composite score for the HFA group ranged from 39 to 126 (mean = 70.76, SD = 21.17) and for the AD group ranged from 47 to 114 (mean = 74.11, SD = 18.33). An independent samples t-test showed no significant differences between the groups for the composite adaptive behaviour standard score (see Table 6.3) ($t(41) = -0.54, p = 0.59$) or for the Communication ($t(41) = -0.87, p = 0.39$), Daily living skills subscale ($t(41) = -0.60, p = 0.55$), and Socialization ($t(41) = 0.07, p = 0.95$) subscales of the VABS.

Receptive language: The receptive language on the PPVT-III of the HFA group ranged from 72 to 131 (mean = 101.56, SD = 16.46) and for the AD group ranged from 79 to 138 (mean = 109.94, SD = 18.06). An independent samples t-test showed no significant difference between the groups with respect to the PPVT-III mean standard score (see Table 6.3) ($t(41) = -1.58, p = 0.12$).

Autistic symptoms: A significant difference was found between the HFA (mean = 21.16, SD = 5.15) and AD groups (mean = 17.56, SD = 5.52) on the ADI-R social domain ($t(41) = 2.20, p = 0.03$). There was no significant difference between the groups on the ADI-R communication ($t(41) = 1.02, p = 0.31$) and behaviour domains ($t(41) = 0.63, p = 0.54$) (see Table 6.3).

Table 6.3 IQ, Adaptive Behaviour and Receptive Language: Means and Standard Deviations of the HFA and AD groups.

Variable	HFA Mean (SD)	AD Mean (SD)	T or x	Df	P
Age	11.48 (2.57)	12.56 (2.60)	-1.35	41	0.19
KBIT					
Vocabulary	101.76 (14.67)	107.39 (13.16)	-1.30	41	0.20
Matrices	103.24 (15.76)	106.00 (12.29)	-0.62	41	0.55
KBIT Composite Standard Score	102.68 (15.90)	107.67 (12.77)	-1.10	41	0.28
VABS					
Communication	79.52 (28.57)	86.50 (22.04)	-0.87	41	0.39
Daily living skills	70.56 (23.75)	74.83 (22.22)	-0.50	41	0.55
Socialization	73.52 (17.34)	73.17 (15.62)	0.07	41	0.95
Adaptive Behavior Composite Standard Score	70.76 (21.17)	74.11 (18.33)	-0.54	41	0.59
PPVT-III					
PPVT-III Standard Score	101.56 (16.46)	109.94 (18.06)	-1.58	41	0.12
ADI-R					
Social	21.16 (5.15)	17.56 (5.52)	2.20	41	0.03*
Communication	16.44 (4.58)	15.06 (4.11)	1.02	41	0.31
Behaviour	6.40 (2.69)	5.89 (2.56)	0.63	41	0.54

*Significant at the < 0.05 level

**Significant at the < 0.01 level

Social skills training: Of the HFA group 20.0% (5) had participated in one or more social skills training programs compared with 38.9% (7) from the AD group. Yates' Correction for Continuity chi-square analysis showed no significant difference in the number of participants who had participated in social skills training; χ^2 (df = 1, N = 43) = 1.04, p = 0.31.

Medication: Of the HFA group 36.0% (9) were taking medication (including stimulants, anti-depressants, anti-psychotics, anti-convulsants and anxiolytic medication) compared to 33.3% (6) from the AD group. Yates' Correction for Continuity chi-square analysis showed no significant difference between the HFA and AD groups for medication; χ^2 (df = 1, N = 41) = 0.00, p = 1.00).

6.1 Summary

The major findings from chapter six were:

- 1) There was a borderline significant difference between the ASD and TD groups with regard to age. The mean age of participants in the ASD group was one year lower than the mean age of participants in the TD group.
- 2) Participants in the ASD group were significantly more likely to be in primary school and receiving education support than those in the TD group.

- 3) There were significantly more participants in the ASD group living in rural areas than the TD group.
- 4) Participants in the ASD group had significantly lower mean scores than the TD group on adaptive behaviour, including communication, daily living skills and socialization.
- 5) There were significantly more participants in the ASD group who had participated in social skills training than in the TD group.
- 6) There were significantly more participants in the ASD group taking medication than those in the TD group.
- 7) There were no significant differences between the ASD and TD groups for variables of socio-economic status, family structure, IQ and receptive language ability.
- 8) There were no significant differences between the HFA and AD groups for age, education support, IQ, adaptive behaviour, receptive language ability, participation in social skills training programs and use of medication.
- 9) Participants from the HFA group had significantly higher mean scores compared to the AD group for the ADI-R social domain score.

Chapter 7

Results

Part III - Testing Hypotheses

As noted in chapter six, the mean age of participants in the ASD group was one year lower than the mean age of participants in the TD group. Post hoc examinations were conducted to explore the relationship between chronological age and responses from the self-understanding interview. In addition, post hoc examinations were conducted to explore the relationships between receptive language ability (as measured by PPVT-III standard score), verbal IQ, performance IQ, full scale IQ and responses from the self-understanding interview and theory of mind (ToM) tasks.

7.1 Hypothesis 1: Self-understanding

Young males with high-functioning ASD are not significantly different from the TD comparison group on a measure of self-understanding.

The results from the Damon and Hart Self-Understanding Interview are presented below.

7.1.1 Verbal productivity

There was no significant difference between the ASD group (mean = 26.42, SD = 11.87) and TD group (mean = 28.50, SD = 7.09) in regard to the total number of statements produced from the Damon and Hart Self-Understanding Interview ($t(69.85) = -0.97, p = 0.34$).

7.1.2 Self-as-subject

The self-as-subject component includes the total self-as-subject score, total scores for each of the three categories that make up the self-as-subject (continuity, agency and distinctness) and scores for four levels across each category.

The total number of statements relating to the self-as-subject was normally distributed and analysed as continuous data. An independent samples t-test showed no significant difference between the ASD group (mean = 6.16, SD = 3.96) and the TD group (mean = 5.92, SD = 2.36) for the total number of self-as-subject statements produced ($t(69.84) = 0.34, p = 0.74$). The participants in the ASD group had a wide range of scores as evidenced by the larger SD suggesting a large range of variability in terms of the number of self-as-subject statements produced.

7.1.3 Self-as-subject: Categories and level analyses

The distribution of scores within the four levels of each category was severely skewed; for this reason the data were combined across levels and the total sum score for each of the three categories was analysed. The data from the three categories were analysed using non-parametric tests because the data were not normally distributed.

Table 7.1 Self-as-subject: Medians and Interquartile ranges (IQR) for ASD and TD groups.

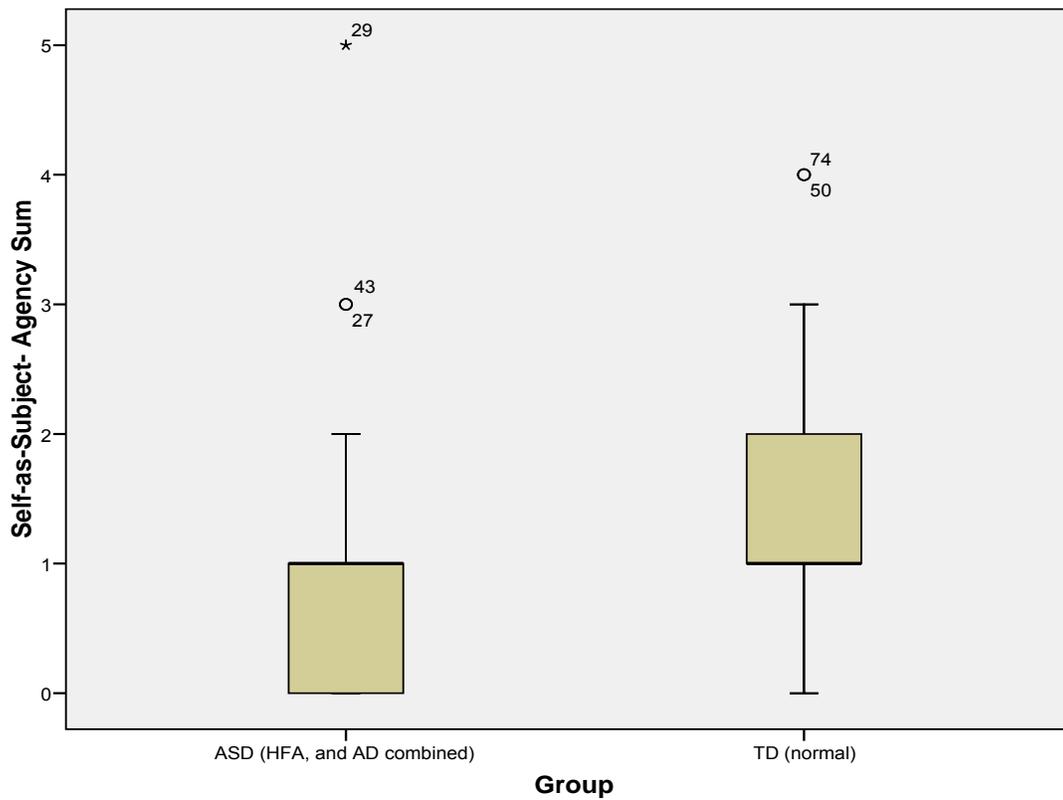
Variable	ASD Median (IQR)		TD Median (IQR)		Z	P
Continuity	2.0	(2.0)	2.0	(1.0)	-0.16	0.88
Agency	1.0	(1.0)	1.0	(1.0)	-2.09*	0.04
Distinctness	3.0	(3.0)	3.0	(1.3)	-0.35	0.73

*Significant at the < 0.05 level

Mann-Whitney U tests showed no significant difference between the ASD and TD groups on continuity (the awareness of self over time) ($z = -0.16$, $p = 0.88$) and distinctness (the awareness of being distinct or different from others) ($z = -0.35$, $p = 0.73$). However, the ASD and TD groups differed on agency (awareness of the formation, existence or control of self). Although the median was the same, the ASD group (median = 1.0, IQR = 1.0 (1.0, 0.0)) produced significantly fewer agency statements than the TD group (median =

1.0, IQR = 1.0 (2.0, 1.0)) ($z = -2.09$, $p = 0.04$). A significant difference was found because most of the ASD group scored below 1.0 and most of the TD group scored above 1.0 (refer to Figure 3). The outliers made the groups more alike rather than different and therefore are unlikely to bias the p-value towards significance.

Figure 3: Median number of agency statements for ASD and TD groups



7.1.4 Post-hoc examination

A post hoc examination of the associations among chronological age (in years), receptive language, verbal IQ, performance IQ, full scale IQ and the sum total of statements produced for each self-as-subject category (continuity, agency and distinctness) was conducted by calculating Spearman Rank Correlation Coefficients. The coefficients are shown in Table 7.2.

Table 7.2 Correlations between self-as-subject and chronological age, receptive language, verbal IQ, performance IQ and full scale IQ among the ASD and TD groups.

	Continuity	Agency	Distinctness
ASD			
Age	-0.08	0.36*	0.19
Receptive language	0.23	0.26	0.32*
Verbal IQ	0.17	0.21	0.33*
Performance IQ	0.13	0.16	0.40**
Full scale IQ	0.15	0.23	0.38*
TD			
Age	0.13	0.17	0.29
Receptive language	0.27	0.35*	0.12
Verbal IQ	0.01	0.09	0.11
Performance IQ	0.01	0.22	0.01
Full scale IQ	0.01	0.22	0.12

*Significant at the < 0.05 level

**Significant at the < 0.01 level

A significant positive relationship was found between chronological age and agency statements for the ASD group ($r = 0.36$, $N = 43$, $p = 0.02$) and distinctness statements correlated with receptive language ability ($r = 0.32$, $N = 43$, $p = 0.04$); verbal IQ ($r = 0.33$, $N = 43$, $p = 0.03$); performance IQ ($r = 0.40$, $N = 43$, $p = < 0.0001$) and full scale IQ ($r = 0.38$, $N = 43$, $p = 0.01$). For the TD group, a significant positive relationship was found between receptive language ability and agency statements ($r = 0.35$, $N = 38$, $p = 0.03$).

Since the mean age of participants in the ASD group was one year lower than the mean age of participants in the TD group, multiple regression analysis was conducted to determine whether age is a significant predictor of self-understanding. Multiple regression analysis was conducted to determine whether age is a significant predictor of self-understanding. Regression analysis showed that age was not an independent predictor of self-as-subject ($t = 0.44$, $p = 0.78$).

7.1.5 Self-as-object

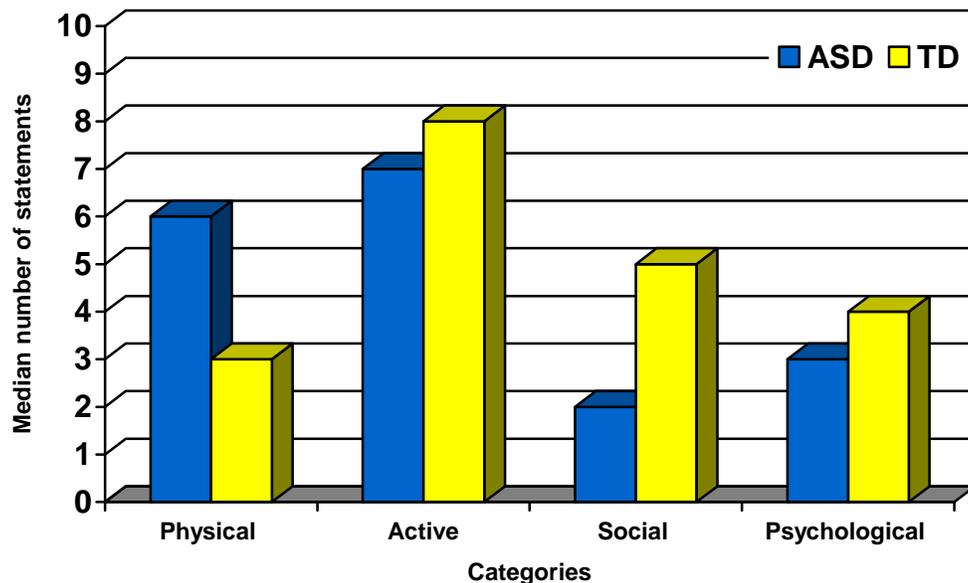
The total number of statements relating to the self-as-object was normally distributed and analysed as continuous data. An independent samples t-test showed no significant difference between the ASD group (mean = 20.26, SD = 9.36) and the TD group (mean = 22.58, SD = 5.77) in regard to the total number of self-as-object statements produced ($t(70.97) = -0.36$, $p = 0.18$).

The participants in the ASD group had a wide range of scores as evidenced by the larger SD suggesting that some participants with ASD produced few statements while others produced many self-as-object statements.

7.1.6 Self-as-object: Category and level analyses

The distribution of scores across categories (Physical, Active, Social and Psychological) and levels (Levels 1 to 4) were analysed as continuous data. The data were not normally distributed and therefore non-parametric tests were used. The median number of statements across the four categories (physical, active, social and psychological) for the ASD and TD groups is presented below in Figure 4.

Figure 4: Self-as-object scheme: Median number of statements across categories



Self-as-object: Category analyses

Mann-Whitney U tests showed a significant difference between the ASD group (median = 6.0, IQR = 5.0) and the TD group (median = 3.0, IQR = 4.3) on physical statements produced, with the ASD group producing significantly more statements concerned with physical-body characteristics than the TD group ($z = -3.09$, $p = < 0.0001$). In contrast, Mann-Whitney U tests showed no significant difference between the ASD group (median = 7.0, IQR = 6.0) and the TD group (median = 8.0, IQR = 5.0) on the total number of statements produced concerned with activities or abilities ($z = -1.48$, $p = 0.14$).

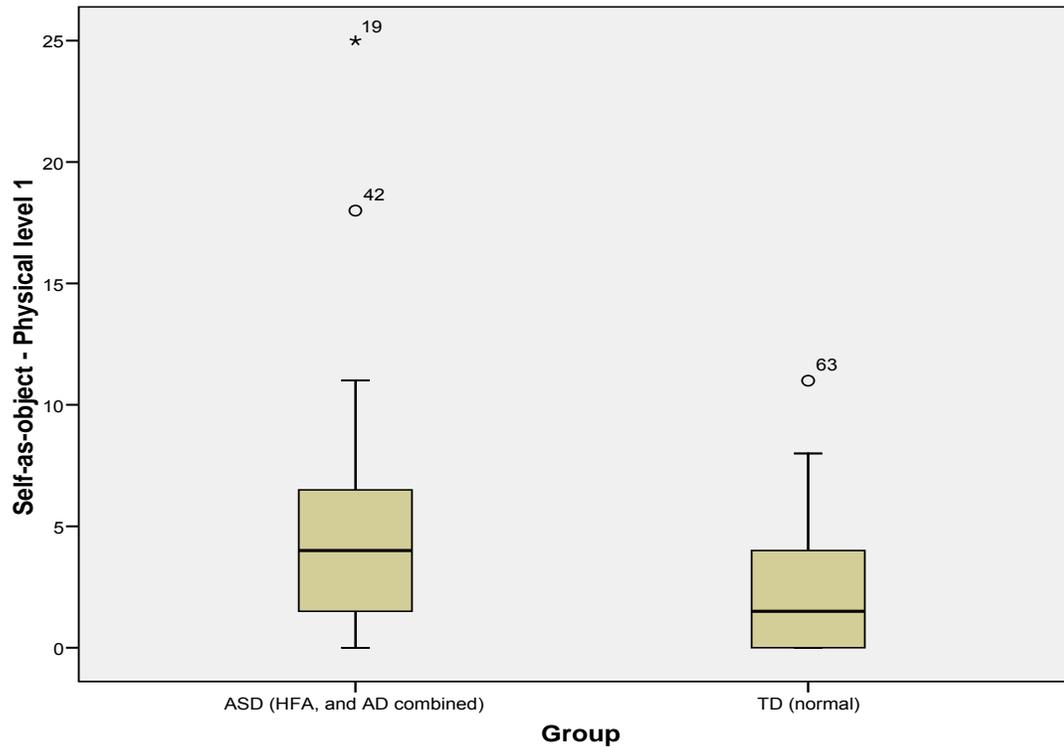
Mann-Whitney U tests showed a significant difference between the ASD (median = 2.0, IQR = 3.0) and TD groups (median = 5.0, IQR = 4.3) on statements concerned with social personality characteristics, social interactions or social relations, with the ASD group produced significantly fewer social statements than the TD group ($z = -4.76$, $p = < 0.0001$). Similarly, Mann-Whitney U tests showed a significant difference between the ASD (median = 3.0, IQR = 3.0) and TD groups (median = 4.0, IQR = 4.3) on statements concerned with emotions, thoughts, or cognitive processes, with the ASD group producing significantly fewer psychological statements than the TD group ($z = -2.61$, $p = 0.01$).

Self-as-object: Level analyses

Physical

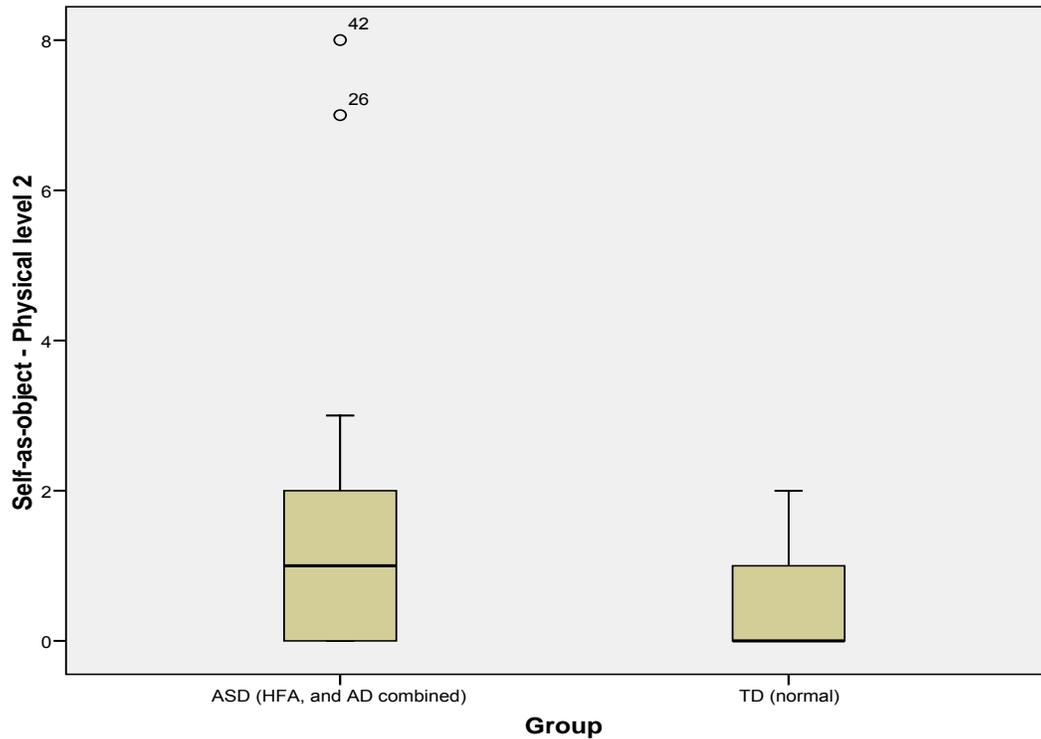
A level one physical statement is defined as physical and material attributes that have significance in and of themselves. There was a significant difference between the ASD group (median = 4.0, IQR = 3.0) and the TD group (median = 1.5, IQR = 4.0), with the ASD group producing significantly more physical statements at level one than the TD group ($z = -2.87$, $p = < 0.0001$).

Figure 5: Median number of physical statements at level one for ASD and TD groups



A level two physical statement is defined as physical and material attributes that reflect the nature of self's activities or capabilities. There was a significant difference between the ASD group (median = 1.0, IQR = 2.0) and the TD group (median = 0.0, IQR = 1.0), with the ASD group producing significantly more physical statements at level two than the TD group ($z = -2.86, p = < 0.0001$).

Figure 6: Median number of physical statements at level two for ASD and TD groups



A level three physical statement is defined as physical and material attributes that influence or reflect the self's social appeal, social interactions, social relations, or group membership. There was no significant difference between the ASD group (median = 0.00, IQR = 1.00) and the TD group (median = 0.00, IQR = 0.25) on the number of physical statements produced at level three ($z = -1.52, p = 0.13$).

A level four physical statement is defined as physical and material attributes that influence or reflect the self's personal philosophy, moral standards or lifestyle. There was no significant difference between the ASD group (median = 0.0, IQR = 1.0) and the TD group (median = 1.0, IQR = 1.3) on the number of physical statements produced at level four ($z = -1.49$, $p = 0.14$).

Active

A level one active statement is concerned with active attributes that reflect activities that the self performs, or activities that are allowed, forbidden, or demanded of the self. There was no significant difference between the ASD (median = 2.0, IQR = 3.0) and TD groups (median = 2.0, IQR = 2.0) on the number of active statements produced at level one ($z = -0.60$, $p = 0.55$).

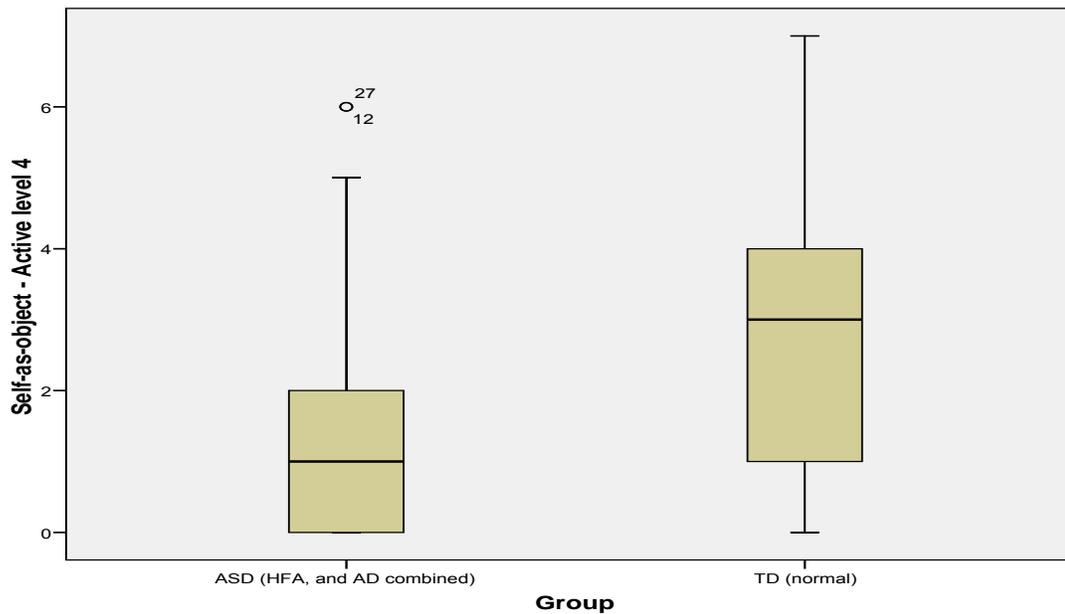
A level two active statement is defined as active attributes that are considered relative to other abilities of the self or to the abilities of others. There was no significant difference between the ASD group (median = 0.0, IQR = 2.0) and TD groups (median = 1.0, IQR = 1.0) on the number of active statements produced at level two ($z = -1.62$, $p = 0.11$).

A level three active statement is defined as active attributes that influence the self's social appeal, social interactions, or group membership. There was no significant difference between the ASD group (median = 2.0, IQR = 4.0) and

TD group (median = 2.0, IQR = 3.0) on the number of active statements produced at level three ($z = -0.65$, $p = 0.52$).

A level four active statement is defined as active attributes that influence or reflect the self's personal philosophy, moral standards, or lifestyle. As can be seen from Figure 7, there was a significant difference between the ASD (median = 1.0, IQR = 2.0) and TD groups (median = 3.0, IQR = 3.3), with the ASD group producing significantly fewer active statements at level four than the TD group ($z = -3.62$, $p = <0.0001$).

Figure 7: Median number of active statements at level four for ASD and TD groups



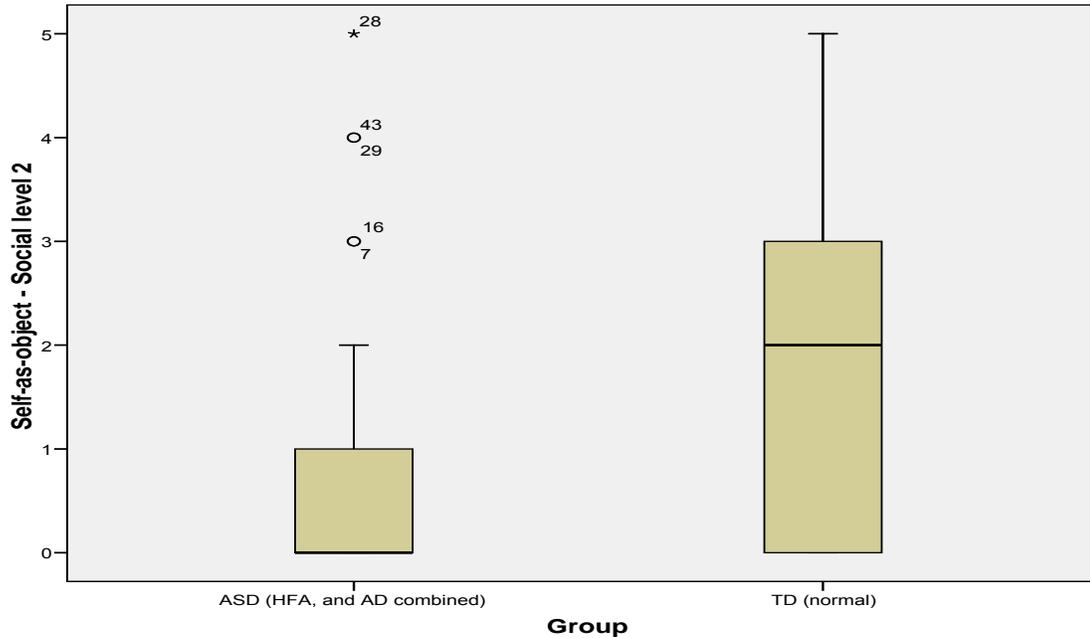
Social

A level one social statement is defined as social attributes of the self that define the self as a member of a social group. There was no significant difference between the ASD group (median = 0.0, IQR = 1.0) and the TD group (median = 0.0, IQR = 1.0) on the number of social statements produced at level one ($z = -0.44$, $p = 0.66$).

A level two social statement is defined as social activities or abilities that are understood with reference to the reactions of others. There was a significant

difference between the ASD group (median = 0.0, IQR = 1.0) and the TD group (median = 2.0, IQR = 3.0), with the ASD group produced significantly fewer social statements at level two than the TD group ($z = -3.09$, $p = < 0.0001$). Refer to Figure 8.

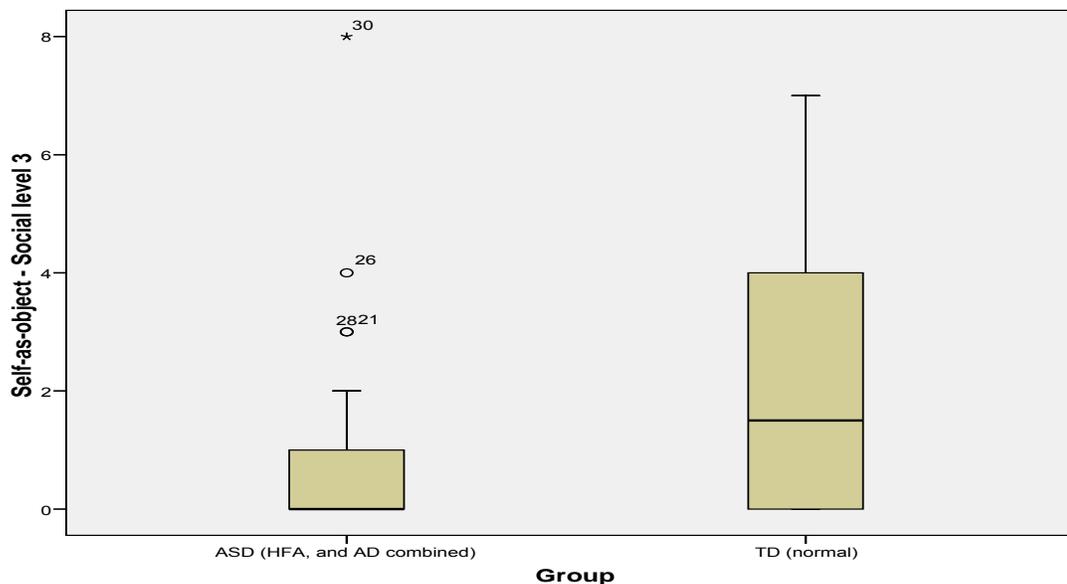
Figure 8: Median number of social statements at level two for ASD and TD groups



A level three social statement is defined as social attributes of the self that reflect the self's personality characteristics or group membership and that influence the nature of the self's social interactions. There was a significant difference between the ASD group (median = 0.0, IQR = 1.0) and the TD

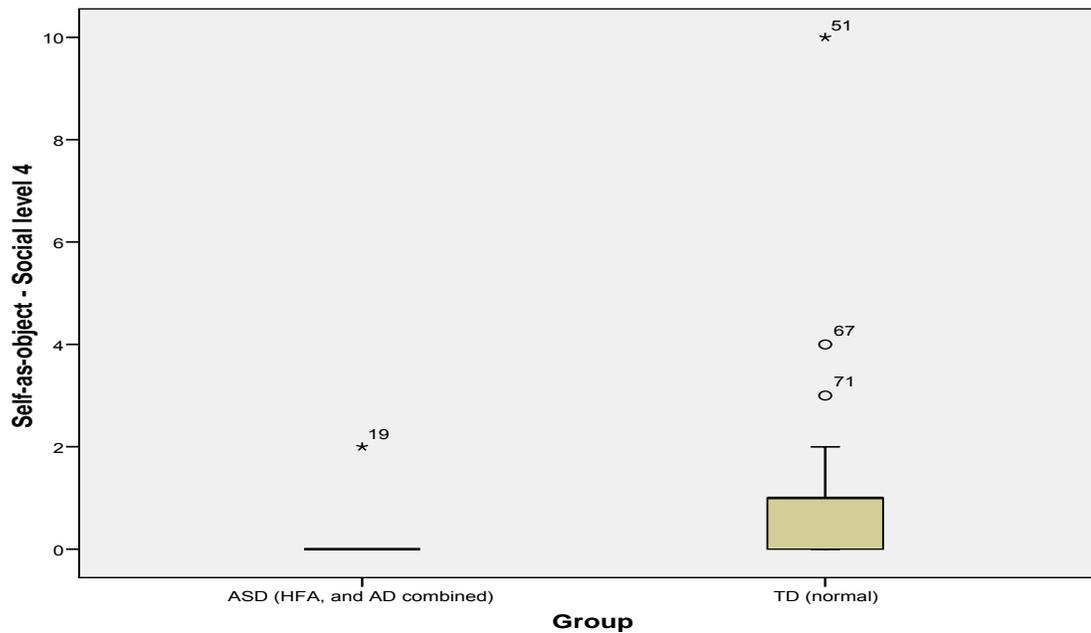
group (median = 1.5, IQR = 4.0), with the ASD group producing significantly fewer social statements at level three than the TD group ($z = -3.82$, $p = < 0.0001$). Refer to Figure 9.

Figure 9: Median number of social statements at level three for ASD and TD groups



A level four social statement is defined as social attributes of the self that reflect or influence the self's personal philosophy, moral standards, or lifestyle. There was a significant difference between the ASD group (median = 0.0, IQR = 0.0) and the TD group (median = 1.0, IQR = 1.0), with the ASD group producing significantly fewer social statements at level four than the TD group ($z = -5.00$, $p = < 0.0001$). Refer to Figure 10.

Figure 10: Median number of social statements at level four for ASD and TD groups



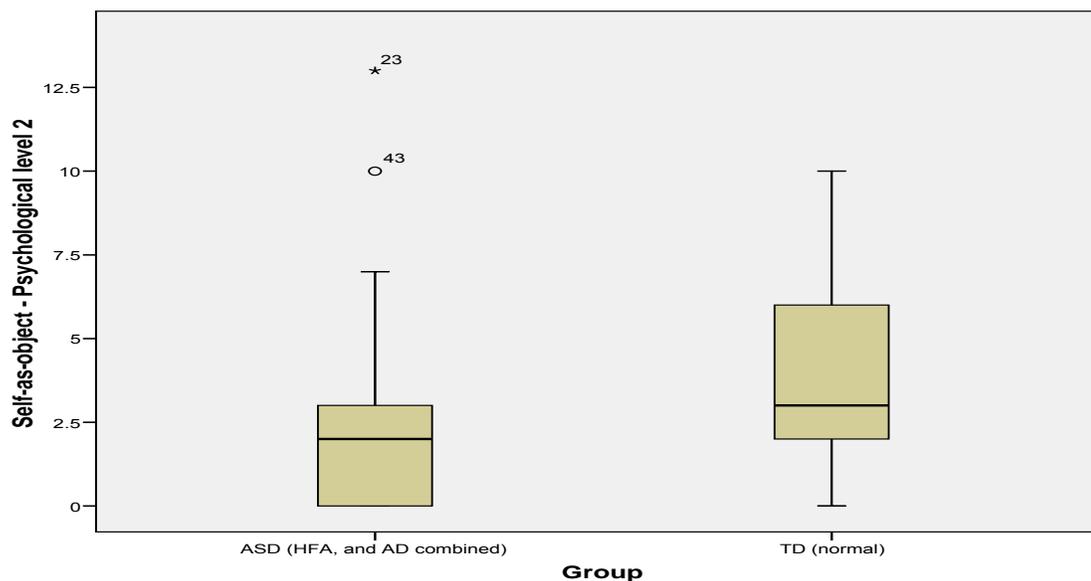
Psychological

A level one psychological statement is defined as attributes that define moods, and feelings that have significance in and of themselves. There was no significant difference between the ASD group (median = 0.0, IQR = 0.0) and the TD group (median = 0.0, IQR = 0.0) on the number of psychological statements produced at level one ($z = -1.14, p = 0.26$).

A level two psychological statement is defined as those attributes that reflect the self's cognitive capabilities, acquired knowledge, or activity – related

emotional states. There was a significant difference between the ASD group (median = 2.0, IQR = 3.0) and the TD group (median = 3.0, IQR = 4.0), with the ASD group producing significantly fewer psychological statements at level two than the TD group ($z = -2.45$, $p = <0.0001$). Refer to Figure 11.

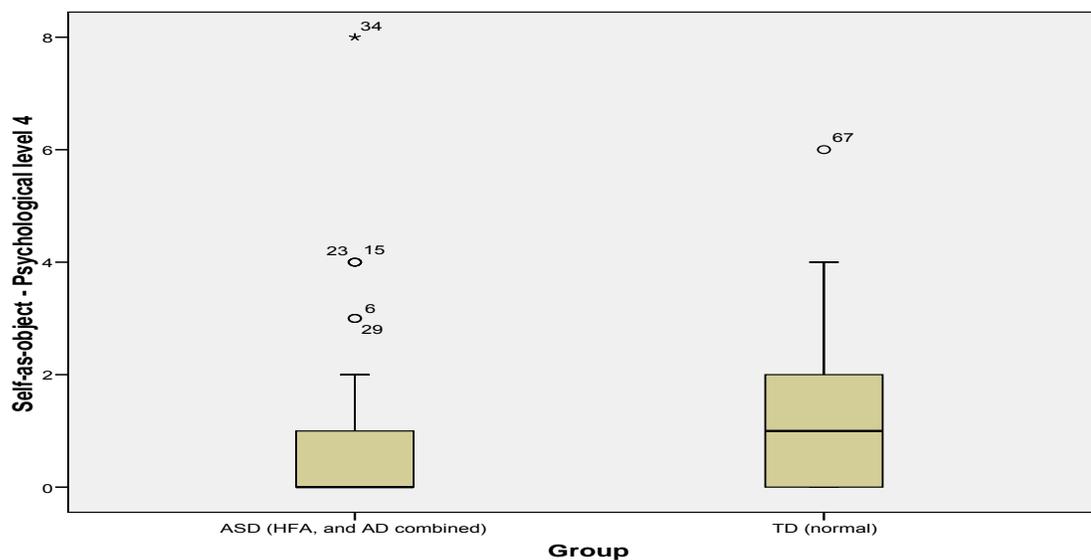
Figure 11: Median number of psychological statements at level two for ASD and TD groups



A level three psychological statement is defined by psychological attributes that reflect or influence social skills or social interactions. There was no significant difference between the ASD group (median = 0.0, IQR = 0.0) and the TD group (median = 0.0, IQR = 1.0) on the number of psychological statements produced at level three ($z = -0.78$, $p = 0.43$).

A level four psychological statement is defined by psychological attributes that reflect the self's personal philosophy, moral standards, or lifestyle. There was a significant difference between the ASD group (median = 0.0, IQR = 1.0) and the TD group (median = 1.0, IQR = 2.0), with the ASD group producing significantly fewer psychological statements at level four than the TD group ($z = -2.73$, $p = 0.01$). Refer to Figure 12.

Figure 12: Median number of psychological statements at level four for ASD and TD groups



7.1.7 Post-hoc examination

A post hoc examination of the associations among chronological age (in years) receptive language, verbal IQ, performance IQ and full scale IQ and

the sum total of statements produced for each self-as-object category (physical, active, social and psychological) was conducted by calculating Spearman Rank Correlation Coefficients (see Table 7.3).

Table 7.3 Correlations between self-as-object categories and chronological age, receptive language, verbal IQ, performance IQ and full scale IQ amongst the ASD and TD groups.

	Physical	Active	Social	Psychological
ASD				
Age	-0.40**	0.23	0.30	0.46**
Receptive language	-0.14	0.07	-0.06	0.44**
Verbal IQ	-0.09	0.12	-0.04	0.32*
Performance IQ	0.09	0.15	0.08	0.28
Full scale IQ	0.01	0.12	0.06	0.36*
TD				
Age	-0.23	-0.19	0.42**	0.42**
Receptive language	0.23	-0.10	0.15	0.32
Verbal IQ	0.05	-0.14	-0.14	0.21
Performance IQ	0.23	0.08	0.02	0.14
Full scale IQ	0.24	-0.00	-0.10	0.25

*Significant at the < 0.05 level

**Significant at the < 0.01 level

For the ASD group, there was a significant negative relationship between physical statements and chronological age ($r = -0.40$, $N = 43$, $p = < 0.0001$).

There were significant positive relationships between psychological statements and chronological age ($r = 0.46$, $N = 43$, $p = < 0.0001$), receptive language ability ($r = 0.44$, $N = 43$, $p = < 0.0001$), verbal IQ ($r = 0.32$, $N = 43$, $p = 0.03$) and full scale IQ ($r = 0.36$, $N = 43$, $p = 0.02$).

For the TD group, there were significant positive relationships between chronological age and psychological statements ($r = 0.42$, $N = 38$, $p = < 0.0001$) and social statements ($r = 0.42$, $N = 38$, $p = < 0.0001$). There was a borderline significant positive relationship between receptive language ability and psychological statements ($r = 0.32$, $N = 38$, $p = 0.05$).

Multiple regression analysis was conducted to determine whether age is a significant predictor of self-understanding. Regression analysis showed that age was not an independent predictor of self-as-object ($t = 0.82$, $p = 0.26$). Thus, adjusting for age did not alter the association between ASD and self-understanding.

7.1.8 Content analysis

In order to capture those aspects of self understanding which may reveal personal concerns and features of the self unique to participants with ASD, responses to three specific questions were analysed using a content coding scheme. A theme was counted if it was mentioned once during the interview.

References to the identified themes were tallied from each interview. Tables 7.4 present the percentage of participants in the ASD and TD groups mentioning each of the major themes identified. The content analyses revealed common concerns and features of this age group, but also themes that differentiated the groups.

Table 7.4 Common themes mentioned from the self-understanding interview amongst the ASD and TD groups.

	ASD % (frequency)	TD % (frequency)	χ^2	Df	P
Possessions/money/ Material goods	69.80 (30)	47.4 (18)	3.32	1	0.07
Personal achievements	34.9 (15)	68.4 (26)	7.79*	1	0.01
Altruistic/humanitari an concerns	18.6 (8)	36.8 (14)	2.53	1	0.11
Role of family and friends	41.9 (18)	65.8 (25)	3.73	1	0.05
Acceptance by others	23.3 (10)	7.9 (3)	2.49	1	0.12
Behaviour	20.9 (9)	5.3 (2)	3.00	1	0.08
Plans for the future	16.3 (7)	28.9 (11)	1.21	1	0.27

*Significant at the < 0.05 level

A theme which clearly differentiated the two groups was the issue of obtaining good marks at school and mentioning their accomplishments in other

activities (e.g. musical ability and sport). Yates' Correction for Continuity chi-square analysis showed a significant difference between the ASD and TD group, with the ASD group mentioning significantly fewer personal achievements than the TD group χ^2 (df= 1, N= 81) = 7.79, p = 0.01.

Another theme which differentiated the groups was the role of family and friends in the formation of self. Yates' Correction for Continuity chi-square analysis showed a borderline significant difference between the ASD and TD groups. Compared to the TD group, the ASD group made significantly fewer references that relate to the role of family and friends; χ^2 (df = 1, N= 81) = 3.73, p = 0.05.

Yates' Correction for Continuity chi-square analysis showed no significant difference between the ASD and TD groups; however, there was a trend for a greater number of references about personal possessions, money and wishes for material goods from the ASD group; χ^2 (df= 1, N= 81) = 3.32, p = 0.07. Similarly, although the Yates' Correction for Continuity chi-square analysis showed no significant difference between the ASD and TD groups in terms of references about personal conduct or behaviour the result approached significance; χ^2 (df= 1, N= 81) = 3.00, p = 0.08.

References to disorder

For the ASD group, 32.2% (13) of participants highlighted their disorder as a salient aspect of their self. In fact, a proportion of ASD participants responded to the question “what are you like?” by referring to their disorder. Given the relevance of this theme to the current study, references to “autism” or “Asperger’s” were tallied throughout the interview. The participants with ASD who mentioned their disorder tended to do so in a negative way. Table 7.5 presents the percentage of participants with ASD who referred to their disorder and whether they mentioned it in a positive, neutral or negative manner.

Table 7.5 Percentage and frequency of ASD group who mention their disorder

	ASD % (frequency)	HFA % (frequency)	AD % (frequency)
Specific references to disorder	30.2 (13)	28.0 (7)	33.3 (6)
Positive references	9.3 (4)	8.0 (2)	11.1 (2)
Neutral references	4.7 (2)	8.0 (2)	0.0 (0)
Negative references	16.3 (7)	12.0 (3)	22.2 (4)

Yates' Correction for Continuity chi-square analysis showed no significant difference between the HFA and AD groups on specific references to their disorder; χ^2 (df = 1, N= 43) = 0.00, p = 0.97.

7.2 Hypothesis 2: Self-understanding in HFA and AD

Young males with high-functioning autism (HFA) are not significantly different from young males with Asperger's disorder (AD) on a measure of self-understanding.

7.2.1 Verbal productivity

There was no significant difference between the HFA (mean = 25.44, SD = 11.27) and AD groups (mean = 27.78, SD = 12.85) in regard to the total number of statements produced from the Damon and Hart Self-Understanding Interview ($t(41) = -0.63, p = 0.53$).

7.2.2 Self-as-subject

There was no significant difference between the HFA (mean = 5.76, SD = 3.52) and AD groups (mean = 6.72, SD = 4.55) in regard to the total number of self-as-subject statements produced ($t(41) = -0.78, p = 0.44$). Similarly, there was no significant difference between the HFA and AD groups on the self-as-subject categories of continuity ($z = -0.67, p = 0.51$), agency ($z = -0.46, p = 0.65$) and distinctness ($z = -0.91, p = 0.36$). See Table 7.6

Table 7.6 Self-as-subject: Medians and Interquartile ranges (IQR) for HFA and AD groups.

Variable	HFA Median (IQR)		AD Median (IQR)		Z	P
Continuity	2.0	(2.0)	1.0	(3.0)	-0.67	0.51
Agency	1.0	(1.0)	1.0	(2.0)	-0.46	0.65
Distinctness	3.0	(2.5)	3.5	(4.5)	-0.91	0.36

Mann-Whitney U tests showed no significant difference between the HFA and the AD groups on continuity ($z = -0.67$, $p = 0.51$), agency ($z = -0.46$, $p = 0.65$) and distinctness ($z = -0.91$, $z = 0.36$).

7.2.3 Post-hoc examination

A post hoc examination of the associations among chronological age (in years), receptive language, verbal IQ, performance IQ, full scale IQ and the sum total of statements produced for each self-as-subject category (continuity, agency and distinctness) was conducted by calculating Spearman Rank Correlation Coefficients. The coefficients are shown in Table 7.7.

Table 7.7 Correlations between self-as-subject and chronological age, receptive language, verbal IQ, performance IQ and full scale IQ among the HFA and AD groups.

	Continuity	Agency	Distinctness
HFA			
Age	0.02	0.31	0.20
Receptive language	0.16	0.46	0.30
Verbal IQ	0.16	0.38	0.41*
Performance IQ	-0.01	0.47*	0.34
Full scale IQ	0.05	0.51*	0.40
AD			
Age	-0.21	0.41	0.14
Receptive language	0.36	0.14	0.32
Verbal IQ	0.28	-0.06	0.25
Performance IQ	0.38	-0.27	0.50*
Full scale IQ	0.27	-0.11	0.30

*Significant at the < 0.05 level

In the HFA group, significant positive relationships were found between agency statements and performance IQ ($r = 0.47$, $N = 25$, $p = 0.02$) and full scale IQ ($r = 0.51$, $N = 25$, $p = 0.01$). Significant positive relationship was found for distinctness statements and verbal IQ ($r = 0.41$, $N = 25$, $p = 0.04$). A borderline significant positive relationship was found between distinctness statements and full scale IQ ($r = 0.40$, $N = 25$, $p = 0.05$). In the AD group, a

significant positive relationship was found between distinctness statements and performance IQ ($r = 0.50$, $N = 18$, $p = 0.04$).

7.2.4 Self-as-object

The total number of statements relating to the self-as-object was normally distributed and analysed as continuous data. An independent samples t-test showed no significant difference between the HFA (mean = 19.68, SD = 8.69) and AD groups (mean = 21.06, SD = 10.44) in regard to the total number of self-as-object statements produced ($t(41) = -0.47$, $p = 0.64$).

The distribution of scores across the categories (physical, active, social and psychological) and levels (Levels 1 to 4) were analysed as continuous data. The data were not normally distributed and therefore non-parametric tests were used.

7.2.5 Self-as-object: Categories and level analyses

The median number of statements across the four categories (physical, active, social and psychological) for the HFA and AD groups is presented in Figure 7.8.

Table 7.8 Medians and Interquartile ranges (IQR) of HFA and AD groups on categories.

Category	HFA Median (IQR)	AD Median (IQR)	Z	P
Physical	7.0 (4.5)	4.5 (4.3)	-1.84	0.07
Active	5.0 (7.0)	7.5 (5.5)	-0.84	0.40
Social	2.0 (1.5)	1.5 (4.3)	-0.05	0.96
Psychological	3.0 (3.0)	2.5 (7.3)	-0.44	0.66

Self-as-object: Category analyses

There was no significant difference between the HFA and AD groups on the total number of physical ($z = -1.84$, $p = 0.07$), active ($z = -0.84$, $p = 0.40$), social ($z = -0.05$, $p = 0.96$) and psychological statements produced ($z = -0.44$, $p = 0.66$).

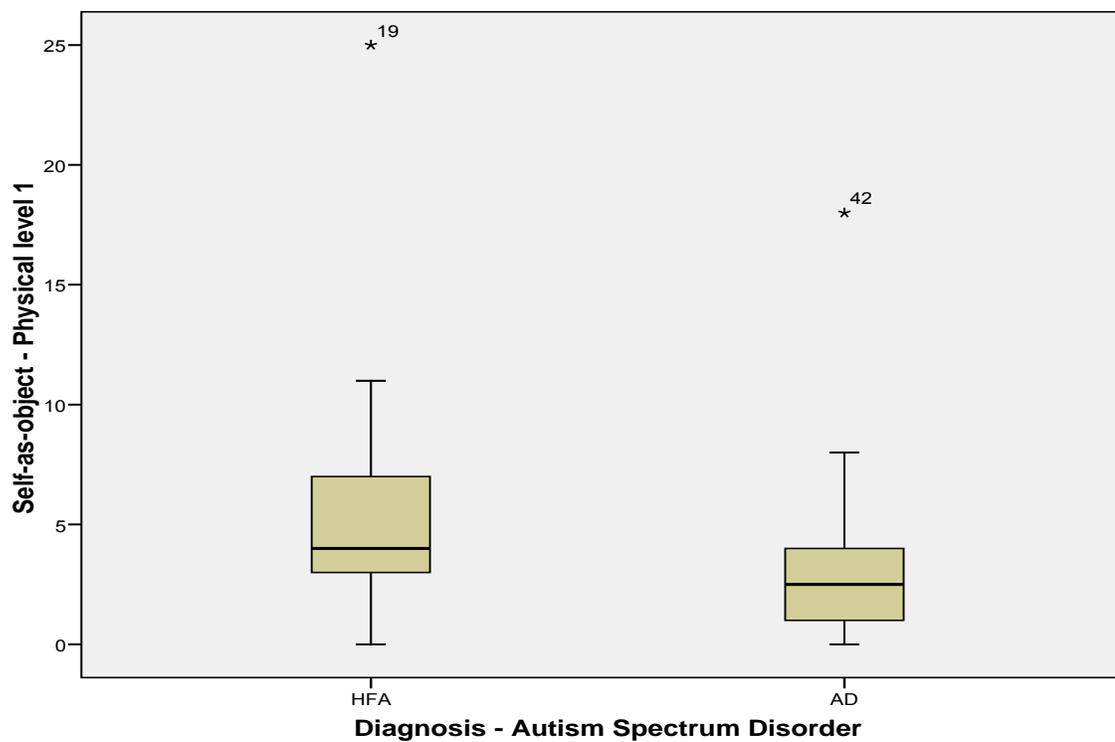
Self-as-object: Level analyses

Physical

There was a significant difference between the HFA (median = 4.0, IQR = 4.0) and AD groups (median = 2.5, IQR = 4.0) on the number of level one physical statements produced, with the HFA group producing significantly more physical statements at level one than the AD group ($z = -2.19$, $p = 0.03$) (see Figure 13). There were no significant differences between the HFA and

AD groups on the number of physical statements produced at level two (HFA: median = 1.0, IQR = 1.0; AD: median = 1.0, IQR = 3.0) ($z = -1.10$, $p = 0.27$), level three (HFA: median = 0.0, IQR = 0.3; AD: median = 0.5, IQR = 1.0) ($z = -1.16$, $p = 0.25$) and level four (HFA: median = 1.0, IQR = 2.0; AD: median = 0.0, IQR = 1.0) ($z = -1.40$, $p = 0.16$).

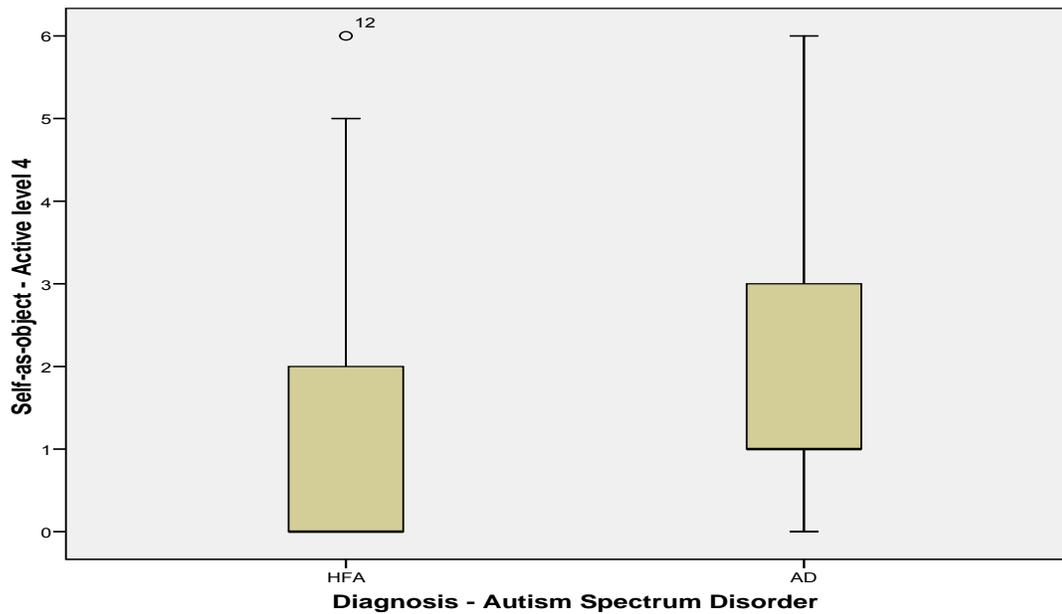
Figure 13: Median number of physical statements at level one for HFA and AD groups



Active

There was no significant difference between the HFA and AD groups on the number of active statements produced at level one (HFA: median = 1.0, IQR = 3.0; AD: median = 2.0, IQR = 2.3) ($z = -0.44$, $p = 0.66$), level two (HFA: median = 0.0, IQR = 2.0; AD: median = 1.0, IQR = 2.5) ($z = -1.10$, $p = 0.27$) and three (HFA: median = 2.0, IQR = 4.0; AD: median = 2.0, IQR = 2.5) ($z = -0.34$, $p = 0.74$). There was however, a borderline significant difference between the HFA (median = 0.0, IQR = 2.0) and AD groups (median = 1.0, IQR = 2.3) on the number of active statements produced at level four, with the HFA group producing fewer active statements at level four than the AD group ($z = -1.98$, $p = 0.05$). Refer to Figure 14.

Figure 14: Median number of active statements at level four for HFA and AD groups



Social

There was no significant difference between the HFA and AD groups on the number of social statements produced at level one (HFA: median = 0.0, IQR = 1.0; AD: median = 0.0, IQR = 1.0) ($z = -0.97$, $p = 0.33$), level two (HFA: median = 0.0, IQR = 1.0; AD: median = 0.5, IQR = 2.0) ($z = -1.00$, $p = 0.32$), level three (HFA: median = 0.0, IQR = 1.0; AD: median = 0.0, IQR = 1.3) ($z = -0.33$, $p = 0.74$) and level four (HFA: median = 0.0, IQR = 0.0; AD: median = 0.0, IQR = 0.0) ($z = -0.85$, $p = 0.40$).

Psychological

There was no significant difference between the HFA and AD groups on the number of psychological statements produced at level one (HFA: median = 0.0, IQR = 0.0; AD: median = 0.0, IQR = 0.0) ($z = -0.29$, $p = 0.77$), level two (HFA: median = 1.0, IQR = 3.0; AD: median = 2.0, IQR = 6.0) ($z = -0.43$, $p = 0.67$), level three (HFA: median = 0.0, IQR = 0.0; AD: median = 0.0, IQR = 0.3) ($z = -0.49$, $p = 0.62$) and level four (HFA: median = 0.0, IQR = 1.0; AD: median = 0.0, IQR = 1.3) ($z = -0.05$, $p = 0.96$).

7.2.6 Post-hoc examination

A post hoc examination of the associations among chronological age (in years) receptive language, verbal IQ, performance IQ and full scale IQ and the sum total of statements produced for each self-as-object category (physical, active, social and psychological) was conducted by calculating Spearman Rank Correlation Coefficients. The coefficients are shown in Table 7.9

Table 7.9 Correlations between self-as-object categories and chronological age, receptive language, verbal IQ, performance IQ and full scale IQ amongst the HFA and AD groups.

	Physical	Active	Social	Psychological
HFA				
Age	-0.48*	0.35	0.32	0.60**
Receptive language	-0.29	0.11	-0.09	0.52**
Verbal IQ	-0.34	0.26	-0.15	0.39
Performance IQ	-0.00	0.19	0.22	0.45*
Full scale IQ	-0.19	0.21	0.06	0.50*
AD				
Age	-0.25	-0.06	0.24	0.39
Receptive language	0.13	-0.11	0.04	0.28
Verbal IQ	0.27	-0.12	0.07	0.20
Performance IQ	0.18	0.11	-0.03	-0.02
Full scale IQ	0.22	-0.12	-0.00	0.13

*Significant at the < 0.05 level

**Significant at the < 0.01 level

For the HFA group, there were significant positive correlations between chronological age and physical statements ($r = 0.48$, $N = 25$, $p = 0.02$) and psychological statements ($r = 0.60$, $N = 25$, $p = < 0.0001$). For the HFA group, age may be a factor in explaining the number of physical and psychological statements produced. There were also significant positive correlations between psychological statements and receptive language ability

($r = 0.52$, $N = 25$, $p = < 0.0001$), performance IQ ($r = 0.45$, $N = 25$, $p = 0.02$) and full scale IQ ($r = 0.50$, $N = 25$, $p = 0.01$). There were no significant correlations between these same variables for the AD group.

7.2.7 Content analysis

In order to capture those aspects of self understanding which may reveal personal concerns and features of the self unique to participants with HFA and AD, responses to three specific questions were analysed using a content coding scheme. A theme was counted if it was mentioned once during the interview. References to the identified themes were tallied from each interview. Table 7.10 presents the percentage of participants with HFA and AD mentioning each of the major themes identified.

Table 7.10 Common themes mentioned from the self-understanding interview amongst the HFA and AD groups.

	HFA % (frequency)		AD % (frequency)		χ^2	Df	P
Possessions/ Material goods	76.0	(19)	61.1	(11)	0.51	1	0.48
Personal achievements	28.0	(7)	44.4	(8)	0.63	1	0.43
Altruistic/humanita rian concerns*	20.0	(5)	16.7	(3)			1.00
Role of family and friends	40.0	(10)	44.4	(8)	0.00	1	1.00
Acceptance by others*	24.0	(6)	22.2	(4)			1.00
Behaviour*	24.00	(6)	16.7	(3)			0.71
Plans for the future*	16.0	(4)	16.7	(3)			1.00

*p-values were computed using Fisher's Exact Test

The content analyses revealed common concerns and features of the groups but there were no themes that differentiated the HFA and AD groups.

7.3 Hypothesis 3: Self-understanding and social functioning

There is no significant relationship between self-understanding (as measured by scores on the self-understanding interview) and social functioning (as measured by scores from Vineland Adaptive Behaviour Scales Socialization Domain) for young males with high-functioning ASD.

To investigate the relationship between self-understanding and social functioning, the groups' responses from the seven categories of the self-understanding interview (agency, continuity, distinctness, physical, active, social and psychological) and the total self-as-subject and self-as-object scores were correlated with the score from the VABS socialization domain using a non-parametric test (see table 7.11).

The Spearman Rank Correlation Coefficient showed for the ASD group, a significant positive relationship between social functioning (as measured by the VABS socialization domain) and distinctness statements ($r = 0.32$, $N = 43$, $p = 0.03$) and total self-as-subject statements and social functioning (as measured by the socialization domain from the VABS) ($r = 0.36$, $N = 43$, $p = 0.02$). For the ASD group, self-understanding is a factor that explains social functioning. In the TD group, there were no significant relationships found between self-understanding and social functioning.

Table 7.11 Correlations between scores from the self-understanding interview and VABS socialization domain amongst the ASD and TD groups.

VABS Socialization Domain	
ASD	
<i>Self-as subject</i>	
Continuity	0.19
Agency	0.20
Distinctness	0.32*
Total self-as-subject	0.36*
<i>Self-as-object</i>	
Physical	0.12
Active	0.06
Social	0.13
Psychological	0.23
Total self-as-object	0.12
TD	
<i>Self-as-subject</i>	
Continuity	0.19
Agency	0.09
Distinctness	0.17
Total self-as-subject	0.27
<i>Self-as-object</i>	
Physical	-0.03
Active	-0.09
Social	0.00
Psychological	0.28
Total self-as-object	0.05

* Significant at the < 0.05 level

7.4 Hypothesis 4: Self-understanding and social functioning in HFA and AD

There is no significant relationship between self-understanding (as measured by scores on the self-understanding interview) and social functioning (as measured by scores from Vineland Adaptive Behaviour Scales Socialization Domain) for young males with HFA and AD.

Table 7.12 presents the correlation between scores from socialization domain from the VABS and the self-understanding interview for the two ASD groups. Within the HFA group, a significant positive relationship was found between agency self-statements and social functioning (as measured by the VABS socialization domain) ($r = 0.45$, $N = 25$, $p = 0.02$). For the HFA group, self-understanding may be a factor in explaining social functioning scores. For the AD group, there were no significant relationships found between self-understanding and social functioning.

Table 7.12 Correlations between scores from the self-understanding interview and VABS socialization domain amongst the HFA and AD groups.

VABS Socialization Domain	
HFA	
<i>Self-as subject</i>	
Continuity	0.06
Agency	0.45*
Distinctness	0.34
Total self-as-subject	0.35
<i>Self-as-object</i>	
Physical	0.13
Active	0.06
Social	0.09
Psychological	0.21
Total self-as-object	0.15
AD	
<i>Self-as-subject</i>	
Continuity	0.34
Agency	-0.09
Distinctness	0.34
Total self-as-subject	0.43
<i>Self-as-object</i>	
Physical	0.03
Active	0.09
Social	0.21
Psychological	0.19
Total self-as-object	0.03

* Significant at the < 0.05 level

7.5 Hypothesis 5: Theory of mind

Young males with high-functioning ASD are not significantly different from the TD comparison group on false-belief ToM tasks.

The distribution of scores for ToM (first-order false-belief task, second-order false-belief task and second-order false-belief justification question) were analysed as categorical data. The results for the ASD and TD groups are presented in Table 7.13.

Table 7.13 Percentage and frequency of ASD and TD groups who passed ToM tasks.

Variable	ASD% (frequency)	TD% (frequency)	χ^2	df	P
First-order	79.1 (34)	92.1 (35)	1.78	1	0.18
Second-order	44.2 (19)	76.3 (29)	7.35*	1	0.01
Second-order Justification	18.6 (8)	34.2 (13)	1.81	1	0.18

*Significant at the < 0.05 level

7.5.1 First-order theory of mind task

The majority of the ASD group, 79.1% (34) passed the first-order ToM task. The TD group approached ceiling, 92.1% (35) passed the first-order ToM task. Yates' Correction for Continuity chi-square analysis showed no

significant difference between the ASD and TD group on the first-order ToM task χ^2 (df = 1, N= 81) = 1.78, p = 0.18.

7.5.2 Second-order theory of mind task

Of the ASD group, 44.2% (19) passed and 55.8% (24) failed the second-order ToM task. Of the TD group, 76.3% (29) passed whilst the remainder failed the second-order ToM task. Yates' Correction for Continuity chi-square analysis showed a significant difference between the ASD and TD groups, with significantly more participants in the TD group passing the second-order belief question; χ^2 (df= 1, N= 81) = 7.35, p = 0.01.

7.5.3 Second-order task justification question

Of the ASD group, 18.6% (8) passed and 81.4% (35) gave one or no mental states in their response and therefore failed the second-order task justification question. Of the TD group, 34.2% (13) passed and 65.8% (25) failed the second-order task justification question. Yates' Correction for Continuity chi-square analysis showed no significant difference between the ASD and TD group on the second-order justification question; χ^2 (df= 1, N= 81) = 1.81, p = 0.18).

7.5.4 Post-hoc examination

A post hoc examination of the associations among chronological (age in years), receptive language, verbal IQ, performance IQ, full scale IQ and performance on ToM tasks was conducted by calculating Spearman Rank Correlation Coefficients. The coefficients are shown in Table 7.14

Table 7.14 Correlations between ToM and chronological age, receptive language, verbal IQ, performance IQ and full scale IQ amongst the ASD and TD groups.

	First-Order ToM	Second-Order ToM	Second-Order ToM Justification Question
ASD			
Age	0.06	0.29	0.24
Receptive language	0.21	0.45**	0.32*
Verbal IQ	0.32*	0.28	0.22
Performance IQ	0.11	0.30	0.35*
Full scale IQ	0.24	0.33*	0.32*
TD			
Age	0.21	0.06	0.29
Receptive language	-0.18	-0.02	-0.17
Verbal IQ	-0.03	0.27	-0.21
Performance IQ	-0.13	0.13	-0.14
Full scale IQ	-1.0	0.19	-0.25

*Significant at the < 0.05 level

**Significant at the < 0.01 level

For the ASD group, there was a significant positive relationship between first-order ToM and verbal IQ ($r = 0.32$, $N = 43$, $p = 0.04$). There were significant positive relationships between second-order ToM and receptive language ($r = 0.33$, $N = 43$, $p = < 0.0001$) and full scale IQ ($r = 0.33$, $N = 43$, $p = 0.03$). There was a borderline significant positive relationship between second-order ToM and performance IQ ($r = 0.30$, $N = 43$, $p = 0.05$). There were significant positive relationships between second-order ToM justification question and receptive language ($r = 0.32$, $N = 43$, $p = 0.04$); performance IQ ($r = 0.35$, $N = 43$, $p = 0.02$) and full scale IQ ($r = 0.32$, $N = 43$, $p = 0.04$). There were no significant relationships for the TD group.

Since the mean age of participants in the ASD group was one year lower than the mean age of participants in the TD group, multiple regression analysis was conducted to determine whether age is a significant predictor of first-order and second-order ToM. Multiple regression analysis showed that age was not an independent predictor of first-order ToM. With ASD in the model, age was not a statistically significant factor for first-order ToM ($t = 0.71$, $p = 0.48$). Similarly, age was not an independent predictor of second-order ToM ($t = 1.75$, $p = 0.84$). Thus, adjusting for age did not alter the association between ASD and first-order or second-order ToM.

7.6 Hypothesis 6: Theory of mind in HFA and AD

Young males with HFA are not significantly different from young males with AD on false-belief ToM tasks.

The distribution of scores for ToM (first-order false-belief task, second-order false-belief task and second-order false-belief justification question) were analysed as categorical data. The results for the HFA and AD groups are presented in Table 7.15.

Table 7.15 Percentages and frequency of HFA and AD groups who passed ToM tasks.

Variable	HFA% (frequency)	AD % (frequency)	χ^2	Df	P
First-order*	76.0 (19)	83.3 (15)		1	0.71
Second-order	32.0 (8)	61.1 (11)	2.51	1	0.11
Second-order Justification*	12.0 (3)	27.8 (5)		1	0.25

*p-values were computed using Fisher's Exact Test

7.6.1 First-order theory of mind task

Of the HFA group, 76.0% (19) passed whilst the remainder failed the first-order ToM task. Of the AD group, 83.3% (15) passed whilst the remainder failed the first-order ToM task. Fisher's Exact Test chi-square analysis showed no significant difference between the HFA and AD groups for the first-order task ($p = 0.71$).

7.6.2 Second-order theory of mind task

Of the HFA group, 32.0% (8) passed and 68.0% (17) failed the second-order ToM task. Of the AD group, 61.1% (11) passed and 38.9% (7) failed the second-order ToM task. Yates' Correction for Continuity chi-square analysis showed no significant difference between the HFA and AD groups on second-order ToM task; χ^2 (df= 1, N= 43) = 2.51, $p = 0.11$.

7.6.3 Second-order task justification question

Of the HFA group, only 12.0% (3) passed whilst the majority failed the second-order justification question. Of the AD group, 27.8% (5) passed whilst the majority failed the second-order justification question. Fisher's Exact Test chi-square analysis showed no significant difference between the HFA and AD groups for the second-order justification question ($p = 0.25$).

7.6.4 Post-hoc examination

A post hoc examination of the associations among chronological (age in years), receptive language, verbal IQ, performance IQ, full scale IQ and performance on ToM tasks was conducted by calculating Spearman Rank Correlation Coefficients. The coefficients are shown in Table 7.16.

Table 7.16 Correlations between ToM and chronological age, receptive language, verbal IQ, performance IQ and full scale IQ amongst the HFA and AD groups.

	First-Order ToM	Second Order ToM	Second-Order ToM Justification Question
HFA			
Age	0.03	0.36	0.20
Receptive language	0.25	0.48*	0.24
Verbal IQ	0.25	0.39	0.26
Performance IQ	0.15	0.38	0.38
Full scale IQ	0.16	0.40	0.33
AD			
Age	0.09	0.06	0.22
Receptive language	0.19	0.26	0.35
Verbal IQ	0.37	0.01	0.16
Performance IQ	0.04	0.23	0.32
Full scale IQ	0.33	0.18	0.28

*Significant at the < 0.05 level

**Significant at the < 0.01 level

For the HFA group, there was a significant positive relationship between receptive language and second-order ToM ($r = 0.48$, $N = 25$, $p = 0.02$) and a borderline significant positive relationship between full scale IQ and second-

order ToM ($r = 0.40$, $N = 25$, $p = 0.05$). There were no significant correlations for these same variables for the AD group.

7.7 Hypothesis 7: Self-understanding and theory of mind

There is no significant relationship between self-understanding (as measured by scores from self-understanding interview) and ToM ability (as measured by scores from the false-belief theory of mind tasks) for young males with high-functioning ASD.

The groups' responses from the seven categories of the self-understanding interview (agency, continuity, distinctness, physical, active, social and psychological) and total scores (self-as-subject and self-as-object) were correlated with the ToM scores (first-order task, second-order task, and second-order justification question) using Spearman Rank non-parametric test of correlation. The results for the ASD and TD groups are presented in Table 7.17.

Table 7.17 Correlations between scores from the self-understanding interview and ToM scores amongst the ASD and TD groups.

	First-Order ToM	Second-Order ToM	Second-Order ToM Justification Question
ASD			
<i>Self-as-subject</i>			
Continuity	0.19	0.18	0.17
Agency	0.04	0.21	-0.14
Distinctness	0.23	0.28	0.33*
Total self-as-subject	0.30	0.32*	0.24
<i>Self-as-object</i>			
Physical	-0.03	-0.05	-0.21
Active	0.02	0.31*	0.14
Social	0.10	0.04	0.06
Psychological	-0.08	0.30	0.31*
Total self-as-object	0.07	0.31*	0.14
TD			
<i>Self-as-subject</i>			
Continuity	0.02	-0.08	0.09
Agency	-0.22	-0.03	0.12
Distinctness	0.09	0.21	-0.01
Total self-as-subject	0.03	0.13	0.04
<i>Self-as-object</i>			
Physical	0.11	0.10	-0.07
Active	-0.18	-0.18	-0.21
Social	0.09	-0.04	-0.12
Psychological	0.07	0.08	0.06
Total self-as-object	-0.06	-0.06	-0.27

* Significant at the < 0.05 level

For the ASD group, significant positive relationships were found between second-order ToM and total self-as-subject statements ($r = 0.32$, $N = 43$, $p = 0.04$) and active statements ($r = 0.31$, $N = 43$, $p = 0.04$). Significant positive relationships were found between second-order ToM justification question and distinctness statements ($r = 0.33$, $N = 43$, $p = 0.03$) and psychological statements ($r = 0.31$, $N = 43$, $p = 0.04$). A borderline significant relationship was found between second-order ToM and total self-as-object statements ($r = 0.31$, $N = 43$, $p = 0.05$). For the ASD group, ToM ability may be a factor in explaining scores on the self-understanding interview. For the TD group, there were no significant relationships between self-understanding (as measured by the self-understanding interview) and understanding of others' minds (as measured by ToM tasks).

7.8 Hypothesis 8: Self-understanding and theory of mind in HFA and AD

There is no significant relationship between self-understanding (as measured by scores on the self-understanding interview) and ToM ability (as measured by scores from the false-belief ToM tasks) for young males with HFA and AD.

The Spearman Rank test of correlation was used for the HFA and AD groups (see Table 7.18).

Table 7.18 Correlations between scores from the self-understanding interview and ToM scores amongst the HFA and AD groups.

	First-Order ToM	Second-Order ToM	Second-Order ToM Justification
HFA			
<i>Self-as-subject</i>			
Continuity	0.28	0.17	0.13
Agency	-0.18	0.09	-0.06
Distinctness	0.31	0.13	0.41*
Total self-as-subject	0.29	0.20	0.25
<i>Self-as-object</i>			
Physical	-0.18	-0.16	-0.16
Active	0.03	0.40	0.24
Social	-0.03	0.10	0.01
Psychological	-0.06	0.55**	0.37
Total self-as-object	0.03	0.44*	0.25
AD			
<i>Self-as-subject</i>			
Continuity	0.09	0.28	0.25
Agency	0.30	0.30	-0.26
Distinctness	0.16	0.42	0.19
Total self-as-subject	0.29	0.43	0.15
<i>Self-as-object</i>			
Physical	0.22	0.11	-0.28
Active	0.00	0.11	0.00
Social	0.30	-0.02	0.11
Psychological	-0.13	-0.01	0.27
Total self-as-object	0.09	0.14	0.00

*Significant at the < 0.05 level

**Significant at the < 0.01 level

Within the HFA group, significant positive relationships were found between second-order ToM and psychological statements ($r = 0.55$, $N = 25$, $p = < 0.0001$), and total self-as-object statements ($r = 0.44$, $N = 25$, $p = 0.03$). A borderline significant positive relationship was found between second-order ToM and active statements ($r = .040$, $N = 25$, $p = 0.05$). There were significant positive relationships between second-order justification and distinctness statements ($r = 0.41$, $N = 25$, $p = 0.04$). For the HFA group, ToM may be a factor in explaining scores on the self-understanding interview.

For the AD group, there were no significant relationships between self-understanding (as measured by the self-understanding interview) and understanding of others' minds (as measured by performance on ToM tasks).

Part IV: Subsidiary Analyses

7.9 Theory of mind and social functioning

To determine the nature of the relationship between ToM and social functioning, the ToM scores were correlated with the score from the VABS socialization domain using a non-parametric test (see table 7.19).

Table 7.19 Correlations between ToM scores and social functioning (as measured by the VABS socialization domain) amongst the ASD and TD groups.

VABS Socialization Domain	
ASD	
1 st order ToM task	0.28
2 nd order ToM task	0.14
2 nd order ToM Justification Question	-0.05
TD	
1 st order ToM task	0.21
2 nd order ToM task	0.29
2 nd order ToM Justification Question	-0.07

The Spearman Rank Correlation Coefficients showed no significant relationships between ToM and social functioning for either group. Table 7.20 presents the results for the HFA and AD groups using a non-parametric test.

Table 7.20 Correlations between ToM scores and social functioning (as measured by the VABS socialization domain) amongst the HFA and AD groups.

VABS Socialization Domain	
HFA	
1 st order ToM task	0.25
2 nd order ToM task	0.23
2 nd order ToM Justification Question	-0.01
AD	
1 st order ToM task	0.37
2 nd order ToM task	-0.01
2 nd order ToM Justification Question	-0.17

The Spearman Rank Correlation Coefficients showed no significant relationships between ToM ability and social functioning for either group.

7.10 Self-understanding and participation in formal social skills training programs

As noted in Chapter six, 12 of the ASD group participated in formal social skills training. To determine whether formal social skills training had implications for self-understanding, the ASD group were divided into those who had participated in formal social skills training (SST) and those who had not received social skills training (no-SST). See Table 7.21.

Table 7.21 Medians and Interquartile ranges (IQR) for SST and no-SST groups.

Variable	SST Median (IQR) N = 12		No-SST Median (IQR) N = 31		Z	P
<i>Self-as-subject</i>						
Continuity	2.00	(2.0)	1.00	(3.0)	-1.15	0.25
Agency	1.00	(1.0)	1.00	(1.0)	-1.90	0.58
Distinctness	3.00	(3.0)	3.00	(3.0)	-0.82	0.41
<i>Self-as-object</i>						
Physical	6.00	(6.5)	6.00	(4.0)	-0.10	0.92
Active	7.00	(3.3)	5.00	(8.0)	-0.30	0.77
Social	1.50	(4.5)	2.00	(3.0)	-0.39	0.70
Psychological	3.50	(7.8)	2.00	(3.0)	-0.47	0.64

7.10.1 Self-as-subject: categories

An independent samples t-test showed no significant difference between the SST group (mean = 7.92, SD = 4.27) and the no-SST group (mean = 5.48, SD = 3.68) on total self-as-subject statements ($t = (41) = -1.86$, $p = 0.07$), however, there was trend towards participants in the SST group producing more self-as-subject statements than the no-SST group. Mann-Whitney U tests showed no significant differences between the SST group and the no-SST group on the number of statements produced from the three self-as-subject categories (see Table 7.21).

7.10.2 Self-as-object: categories

An independent samples t-test showed no significant differences between the SST group (mean = 22.42, SD = 8.06) and the no-SST group (mean = 19.42, SD = 9.81) on total self-as-object statements produced ($t = (41) = -0.94$, $p = 0.35$). Mann-Whitney U tests showed no significant differences between the SST and no-SST group on the number of statements produced from the four self-as-object categories (see Table 7.21).

7.11 Theory of mind and participation in social skills training programs

As noted in 7.2, the distribution of scores for ToM (first-order false-belief task, second-order false-belief task and second-order justification question) were

analysed as categorical data. The results for the SST group and no-SST group are presented in Table 7.22.

Table 7.22 Percentage and frequency of SST group and no-SST group who passed ToM tasks.

Variable	SST		No-SST		χ^2	Df	P
	% (frequency)	N = 12	% (frequency)	N = 31			
First-order*	75.0%	(9)	80.6%	(25)		1	0.69
Second-order	50.0%	(6)	41.9%	(13)	0.02	1	0.89
Second-order Justification Question*	0.00%	(0)	25.8%	(8)		1	0.08

*p-values were computed using Fisher's Exact Test

Within the ASD group, Fisher's Exact Test chi-square showed no significant differences between the SST group and the no-SST group on the first-order ToM task ($p = 0.69$). Yates' Correction for Continuity chi-square analysis showed no significant difference between the SST group and the no-SST group on the second-order ToM task; χ^2 (df = 1, N = 43) = 0.02, $p = 0.89$). Although the Fisher's Exact Test chi-square showed no significant difference between the two groups on the second-order justification question the result approached significance ($p = 0.08$).

7.12 Social functioning and participation in social skills training programs

As noted in Chapter six, the distribution of scores for social functioning were analysed as continuous data which were normally distributed. An independent samples t-test was used to determine whether the two groups differed on the VABS socialization subscale. There was no significant difference between the SST group (mean = 76.42, SD = 19.90) and the no-SST group (mean = 72.19, SD = 15.12) on the VABS socialization subscale ($t(41) = -0.75, p = 0.46$).

7.13 Summary

The major findings from chapter seven were:

- 1) Participants in the ASD group produced significantly fewer agency statements (statements that demonstrate awareness or explain the formation, existence or control of self) than the TD group.
- 2) Participants in the ASD group produced significantly more physical statements (physical, body characteristics or material possessions) than the TD group.
- 3) Participants in the ASD group produced significantly fewer social statements (statements concerned with social personality characteristics, social interactions or relations) than the TD group during the self-understanding interview.

- 4) Participants in the ASD group produced significantly fewer psychological statements (statements concerned with emotions, thoughts, or cognitive processes) than the TD group.
- 5) Content analysis revealed common concerns and features for the ASD and TD groups (e.g. possessions, humanitarian issues, acceptance by others and plans for the future). However, one theme clearly differentiated the ASD and TD groups; participants in the ASD group made significantly fewer references to personal achievements compared with the TD group. In addition, the ASD group made significantly fewer references that relate to the role of family and friends.
- 6) For participants in the ASD group, there were significant positive correlations between self-understanding and social functioning. In comparison, there were no significant correlations for the TD group.
- 7) In terms of ToM ability, significantly more participants in the TD group passed the second-order ToM task.
- 8) For participants in the ASD group, there were significant positive correlations between self-understanding and ToM. In comparison, there were no significant relationships between self-understanding and ToM for the TD group.

- 9) There were significant positive correlations between self-understanding and ToM for the HFA group, but no significant correlations for the AD group.
- 10) There was a significant positive correlation between agency statements (from the self-understanding interview) and social functioning for the HFA group. In comparison, there were no significant correlations between self-understanding and social functioning for the AD group.

Chapter 8

Discussion

8.1 Introduction

The deficit in reciprocal social interaction is a core feature of ASD and improvements in social functioning have been identified as one of the most critical areas needing remediation. A thorough understanding of the social difficulties experienced by young people with ASD is required to enable interventions to specifically treat the social deficits. The present study aimed to investigate self-understanding and theory of mind (ToM) because they have been hypothesised as underlying the social impairments experienced by young people with high-functioning ASD. Furthermore this study investigated whether self-understanding is related to ToM for young males with ASD, as social skills interventions aimed at improving self-understanding may simultaneously improve ToM, or vice versa.

Hobson (2002) proposed an order in which children come to understand the social world. He suggested that self-understanding (or self-knowledge) is critical and underlies the ability to understand the mental states of others (ToM). Hobson claimed that because children with autism lack a sense of “themselves” as potential objects of other people’s evaluations they fail to

develop ToM. However, there is little research relating to self-understanding and ToM and the question of how children's developing self provides the infrastructure for ToM has not been addressed in young people with high-functioning ASD. This chapter will discuss the relationship between self-understanding and ToM in young males with high-functioning ASD compared with typically developing (TD) young males.

A secondary aim of this study was to identify whether young males with high-functioning autism (HFA) and Asperger's disorder (AD) could be distinguished in terms of their level of self-understanding and ToM ability and the relationship between these two capacities. These results will add to the growing body of research on the similarities and differences between HFA and AD and will assist in determining whether the two conditions are separate diagnostic entities that can be reliably differentiated.

The present study found a number of significant results, but only those that related to the hypotheses, or that were unique or not supporting current research trends are discussed in this chapter.

8.2 Participant characteristics

Differences in the participant characteristics between the ASD and TD groups and the HFA and AD groups are now discussed.

8.2.1 Differences between ASD and the TD groups

In the present study several differences were found between the ASD and TD groups. There was a borderline significant difference in age, with the mean age of the ASD group being one year lower than the TD group. Regression analysis showed that after adjusting for age the values for the main variables changed marginally if at all. Therefore age is not a significant predictor of ToM and self-understanding.

Participants with ASD were more likely to be in primary school and to have received special education support. The finding of increased educational support for the ASD group was expected since the research has indicated that students with ASD, including those who are cognitively high-functioning, require special education support and services (American Academy of Child and Adolescent Psychiatry, 1999; White, Scahill, Klin, Koeing, & Volkmar, 2007).

Young males with ASD scored lower than the TD group on all domains of the Vineland Adaptive Behavior Scales (VABS) (Sparrow et al., 1984), Communication, Socialization and Daily Living Skills domain scores and the Adaptive Behavior Composite score. The findings from the present study were consistent with previous research (Liss et al., 2001) which indicated deficits in adaptive behaviour (including socialisation and daily living skills)

was strongly correlated with the autistic symptomatology for high-functioning children with autism.

In the present study, young males with ASD were more likely to have participated in social skills training programs than those in the TD group. This was expected since individuals with ASD are characterised by marked impairments in reciprocal social interaction, and consequently social skills training is a common intervention (American Psychiatric Association, 2000; Barry et al., 2003; Blacher, Kraemer, & Schalow, 2003; Mesibov, 1994; Tse, Strulovitch, Tagalakis, Meng, & Fombonne, 2007).

The ASD group were more likely to be taking medication than those in the TD group. This was an expected difference between the groups since medication is often prescribed to people with ASD for associated medical conditions (e.g. epilepsy) and also co-morbid psychopathologies including anxiety, depression and aggressive behaviour (American Academy of Child and Adolescent Psychiatry, 1999; Bellini, 2004; Blacher et al., 2003; Ghaziuddin, Ghaziuddin, & Greden, 2002).

In the present study, more participants with ASD lived in rural areas compared with the TD group. Participants from rural areas may have volunteered more readily in the study because there are fewer services

available in rural areas for children with ASD (Mandell, Maytali, & Zubritsky, 2005; O'Sullivan, Wills, Jackson, & Chalmers, 2008) and they benefited by receiving a summary report, which would have been helpful for families and schools.

8.2.2 Similarities and differences between the HFA and AD groups

Some researchers have found differences in intellectual functioning between individuals with HFA and AD (Ehlers et al., 1997; Fine, Bartolucci, Ginsberg, & Szatmari, 1991; Ghaziuddin & Gerstein, 1996; Gillberg, 1989; Klin et al., 1995; Ozonoff, Rogers et al., 1991; Szatmari et al., 1990; Wurst, 1974). According to these studies, IQ was generally higher in individuals with AD (including full scale IQ and verbal IQ) compared with HFA even when inclusion criteria was an IQ of 70 and above (Gillberg & Ehlers, 1998). Most of this research, however, suffered from a lack of consistent diagnostic criteria, and the extent to which these inadequacies in subject selection procedures accounted for the group differences was unclear (Macintosh & Dissanayake, 2004).

There have been several studies that have adopted strict *Diagnostic Statistical Manual for Mental Disorders-Fourth Edition Text Revision (DSM-IV-TR)* (American Psychiatric Association, 2000) or *International Classification of Diseases-Tenth Edition (ICD-10)* (World Health Organization, 1992a)

diagnostic criteria and have nevertheless found differences in IQ between HFA and AD (Ghaziuddin et al., 1994; Ghaziuddin & Mountain-Kimchi, 2004; Gilchrist et al., 2001; Manjiviona & Prior, 1995; Miller & Ozonoff, 2000; Ozonoff et al., 2000; Szatmari et al., 1995). The present study using the *DSM-IV-TR* (American Psychiatric Association, 2000) criteria found no significant difference in IQ between the groups. Participants with HFA were comparable to participants with AD on verbal IQ, performance IQ and full scale IQ. These findings were consistent with Ghaziuddin, Butler, Tsai and Ghaziuddin (1994) who adhered to strict *ICD-10* (World Health Organization, 1992a) diagnostic criteria and found no significant differences between HFA and AD on IQ. The findings from the present study suggest no significant differences between the HFA and AD on IQ and thus, intellectual functioning may not reliably differentiate groups of children with HFA with AD.

Various areas of strength and weakness in the cognitive profiles of individuals with HFA and AD have been found in previous studies (Ehlers et al., 1997; Ghaziuddin & Mountain-Kimchi, 2004; Gunter, Ghaziuddin, & Ellis, 2002; Iwanaga et al., 2000; Klin et al., 1995; Miller & Ozonoff, 2000). The trend from previous research suggested that individuals with AD exhibit a relatively higher verbal IQ compared to their performance IQ and individuals with HFA tend to exhibit lower verbal IQ in comparison to their performance IQ. Most of this research, however, suffered from a lack of consistent diagnostic criteria

and it is unclear to what extent inadequacies in subject selection procedures accounted for group differences (Macintosh & Dissanayake, 2004). The results from the present study (which applied *DSM-IV-TR* diagnostic criteria) were consistent with Szatmari et al. (1990) and found no discrepancies in the mean VIQ and mean PIQ between the groups suggesting no particular profile of cognitive abilities is characteristic of either disorder and thus, a specific intellectual profile cannot reliably differentiate between children with HFA and AD.

There has been limited research located on the differences in adaptive behaviour between HFA and AD. Where differences have been detected, they have generally been in the direction of children with AD achieving higher scores than those with HFA (Szatmari et al., 1995; Szatmari et al., 2000). However, in both these studies the researchers did not ensure the mutual exclusivity of diagnoses, and many of the participants with AD met criteria for autism (Macintosh & Dissanayake, 2004). Consistent with research by Smily and Meredith (2003) the present study found no significant differences between the HFA and AD groups on the Daily Living Skills and Socialization domains. Neither were there differences found between the groups on the Communication domain and Adaptive Behavior Composite scores.

Studies that have examined differences in receptive language between HFA and AD have produced mixed findings (Ramberg, Ehlers, Nyden, Johansson, & Gillberg, 1996; Szatmari et al., 1995). Szatmari et al (1995) found significant differences between the HFA and AD groups on receptive language, with the AD group achieving higher scores than the HFA group. By contrast, Ramberg, Ehlers et al. (1996) found few differences between school aged children with HFA and AD on measures of receptive and expressive language. Consistent with Ramberg et al. (1996) the present study found no significant differences between the HFA and AD groups on receptive language suggesting that verbal comprehension cannot reliably differentiate children with HFA with AD.

In relation to the core symptoms of ASD, differences between the HFA and AD groups were found in the current study on the Autism Diagnostic Interview-Revised (ADI-R) (Lord et al., 1994). Consistent with Star, Szatmari, Bryson and Zwaigenbaum (2003) the present study found participants with HFA had more symptoms from the social interaction domain and displayed more overall symptoms when they were younger compared with the AD group. The results from the present study suggest that individuals with HFA can be distinguished from individuals with AD on the severity of the social impairment, with the AD group demonstrating fewer and/or less severe symptoms than the HFA group.

As previously mentioned, children with high-functioning ASD are often referred to clinics for social skills training to assist with their social functioning (Barry et al., 2003). There has been no previous research located comparing HFA and AD in terms of participation in social skills training programs. In the present study, participation in social skills training programs was compared between the groups and, as expected, no difference in the participation rate was found.

Differences in participant characteristics between the ASD and TD groups, as well as the HFA and AD groups, have been discussed. In summary, while some expected differences were found between the ASD and TD groups, there was only one difference found between the HFA and AD groups. The remainder of the chapter will address self-understanding, ToM and the relationship between these capacities.

8.3 Self-understanding

An impaired self-understanding has been linked to the social difficulties experienced by individuals with ASD. Hobson (1982) argues that children with ASD fail to develop a “concept of persons” and consequently their knowledge or understanding of self is impaired. However, few studies have investigated self-understanding in young people with ASD and there is no systematic research located on self-understanding in young people with high-

functioning ASD. The evidence available suggests that individuals with ASD express a more restricted range of emotions than TD individuals and they tend not to view themselves in terms of social characteristics and relations with others (Lee & Hobson, 1998; Mavropoulou, 1995; Yoshii & Yoshimatsu, 2003). The only study located which included adults with AD (Mavropoulou, 1995) had a number of methodological issues (Lee & Hobson, 1998). Therefore this is the first systematic study on self-understanding in young people with high-functioning ASD.

One of the aims of the present study was to examine self-understanding in individuals with high-functioning ASD, and explore any possible differences between the HFA and AD groups. Self-understanding was assessed using the Damon and Hart Self-Understanding Interview (Damon & Hart, 1988), a semi-structured interview aimed at eliciting self-descriptions comprising several dimensions that define a person's view of his or her individuality. The results from the self-understanding interviews are discussed below.

8.3.1 Self-understanding in ASD

Inconsistent with the null hypothesis, significant differences were found between the groups on the self-understanding interview. There was a significant difference between the ASD and TD groups in the median agency scores, with the ASD group producing significantly fewer statements that

demonstrate agency. The ASD group were less aware of the formation, existence and control of self compared with the TD group.

A sense of agency (the awareness that one is in control of their actions) has been proposed as being a key component of social cognition (De Vignemont & Fournieret, 2004) and has been associated with deficits in imitation by people with ASD (Hobson & Lee, 1999; Meltzoff & Gopnik, 1993; Rogers, Bennetto, McEvoy, & Pennington, 1996). Thus impairments in agency might be predicted in ASD; however, research has shown a relatively intact sense of agency for this population (David et al., 2007). In the David et al., study (2007) agency was measured using an action monitoring task whereas the present study measured agency using direct questions that aimed to elicit an understanding of agency. Therefore the differences between the studies may owe to the way agency was measured.

In the current study, it is possible that children with ASD achieved lower scores for agency because they found it more difficult than TD children to access their thoughts and understand how their thoughts relate to their behaviour. Awareness of agency is important for regulating behaviour which not only has implications for social functioning but for caregiver stress (Lecavalier, Leone, & Wiltz, 2006).

Consistent with previous research (Lee & Hobson, 1998; Mavropoulou, 1995; Yoshii & Yoshimatsu, 2003), the present study found children with ASD produced significantly more physical characteristics than TD children when describing themselves. Analysis of the physical statements provided by the ASD group revealed significantly more lower level responses (levels 1 and 2) than the TD group and comparable numbers of higher level responses (levels 3 and 4). These findings indicate that children with ASD understand and describe themselves using concrete visual attributes (e.g. "I'm tall"). Furthermore, the results may reflect a delay in the development of self-understanding for individuals with ASD since relatively high proportions of physical self-statements have been reported for young TD children (Damon & Hart, 1988; Guardo & Bohan, 1971; Keller, Ford, & Meacham, 1978).

In the present study, age was negatively correlated with physical statements for the ASD group; the mean age for the ASD group was one year lower than the TD group. Hence, age may have contributed to the higher number of physical attributes reported by the ASD group, and although causality cannot be inferred, it is possible that younger children with ASD produced more physical statements than TD comparisons.

In the present study the quantity of active statements was comparable in the ASD and TD groups. There were, however, differences in the quality of

active statements, with the ASD group producing fewer active statements that reflected the self's personal philosophy, moral standards, or lifestyle (level 4). These findings suggested that individuals with ASD are less aware of the reason or rationale for their actions. For example, children with ASD were equally able to produce active attributes that reflected the activities that the self performs, or the activities that are allowed, forbidden, or demanded of the self (e.g. what are you like? *I play computer games*) but could not produce active statements that reflected the self's personal philosophy, moral standards, or lifestyle (e.g. reasons why one attends school or religious ceremonies). These results provided some support for the notion of a general delay in the development of self-understanding for young people with high-functioning ASD. Therefore, individuals with ASD may need to be taught how to access, describe and explore reasons for their actions in order to improve their self-understanding and hence social skills.

Consistent with previous research on self-understanding in individuals with autism (Lee & Hobson, 1998; Mavropoulou, 1995), the present study found that participants with ASD provided significantly fewer statements reflecting social personality characteristics, social interactions or social relations compared with the TD group. Children with ASD appeared to have difficulties describing themselves in relation to others. Furthermore qualitative analysis revealed that the ASD group produced significantly fewer social statements

that encompassed higher level responses (levels 3 and 4). The results suggested that individuals with high-functioning ASD have difficulties understanding how their personality characteristics can be understood with reference to the reactions of others, influence the nature of their social interactions as well as influence their personal philosophy, moral standards, or lifestyle. Relatively fewer social self-statements have been reported for young TD children (Guardo & Bohan, 1971; Keller et al., 1978). Therefore, these results provide some support for the notion of a general delay in the development of self-understanding for young people with high-functioning ASD and help explain the social difficulties experienced by young people with ASD.

In the present study the ASD group provided significantly fewer psychological statements than the TD group. Given the difficulties children with ASD have in relation to abstract concepts (Leslie & Thaiss, 1992) it was expected that children with ASD would have difficulties describing their emotions, thoughts and cognitive processes. Consistent with Lee and Hobson's (1998) study (on low-functioning individuals with autism) the present study found the psychological statements made by the ASD group were restricted to observable concrete features of the self. These findings support previous research that suggest that individuals with ASD have difficulties recognising, conceptualising and explaining psychological states (Baron-Cohen et al.,

1986; Hill et al., 2004; Hillier & Allinson, 2002; Hurlburt et al., 1994; Tager-Flusberg, 1992; Tager-Flusberg & Sullivan, 1994).

The results from the present study suggest that individuals with high-functioning ASD have difficulties understanding psychological aspects of self including cognitive capabilities, emotional states, personal philosophy and moral standards. The results may not only have repercussions for social functioning but also for educational success. For example, the results suggest that children with ASD could find it difficult to understand different characters perspectives in novels or poetry.

Post-hoc correlational analyses revealed positive relationships between psychological self-statements and age, receptive language and full scale IQ for the ASD group. Within the ASD group the correlations held for the HFA group only. There is a possibility that the current findings reflect a logical progression in self development, such that children with HFA were found to produce more psychological statements with age. Further investigation may need to be conducted to confirm direction of causality.

Intelligence was found to be a possible mediating factor in a child's ability to describe themselves in psychological terms. Higher IQ scores in the HFA group were associated with more psychological self-statements being

produced. There was also a positive correlation between psychological statements and receptive language, supporting the literature on the link between verbal skills and ToM abilities (Eisenmajer & Prior, 1991; Ozonoff, Rogers et al., 1991). The current finding implies that as children's verbal skills develop their ability to describe themselves in psychological terms improves. Further studies may need to be conducted to confirm the direction of causality.

In order to capture those aspects of self-understanding which may reveal personal concerns and features of the self unique to participants with ASD, responses to three specific questions were analysed using a content coding scheme. The only significant difference between the ASD and TD groups was references to personal accomplishments, with the ASD group providing significantly fewer references to personal accomplishments than the TD group. Individuals with high-functioning ASD may have negative self schemas and may not focus on their achievements. This finding is consistent with Capps, Sigman & Yirmiya (1995) who found children with high-functioning ASD gave lower estimates of their overall self-worth. Interventions for individuals with high-functioning ASD should not only teach social skills but increase their awareness of accomplishments and improve their self-worth as this may give them the confidence required to use the skills they have been taught.

8.3.2 Self-understanding in HFA and AD

The present study found no significant differences between the HFA and AD groups on agency, continuity and distinctness. The HFA and AD groups were generally comparable in terms of the quantity and quality of statements produced in the physical, active, social and psychological categories. Thus there were few qualitative differences between the HFA and AD groups.

A central issue in any research that examines self-understanding in individuals who have some kind of diagnostic label applied to them is their understanding of and engagement with, the label itself (Humphrey & Lewis, 2008). What the terms *Asperger's disorder* or *high-functioning autism* mean to a young person and the extent to which this understanding is part of their developing identity, is likely to influence the way in which they make sense of their (and others) experiences (Humphrey & Lewis, 2008). In the present study a very similar profile of concerns emerged for both the HFA and AD groups. In addition, the HFA and AD groups could not be distinguished in terms of "insight" into their own condition.

Of those participants who mentioned their disorder, most did so in a negative way. For example, they talked of having a "mental problem", of not being "normal" and having "a bad brain". This finding that both groups have negative schemas and thoughts about their condition is consistent with

previous research on students with high-functioning ASD (Humphrey & Lewis, 2008) which suggested that these individuals constructed their views from the feedback they receive from others (e.g. from peers, teachers and parents). These findings also related to the issue of pathologising ASD. In the present study, participants with ASD viewed themselves as having a disorder; whereas several authors (Baron-Cohen, 2002; Molloy & Vasil, 2002) have argued that rather than being viewed as a “disorder”, ASD should be viewed and explained as a “difference”.

These findings suggest that HFA and AD are comparable in terms of self-understanding and are consistent with research trends that have failed to differentiate the two groups (Macintosh & Dissanayake, 2004). If these disorders are not distinct, future research should combine the two disorders and clinical definitions.

8.4 Self-understanding and social functioning

There have been no published studies located investigating the relationship between self-understanding and social functioning in young people with high-functioning ASD. To determine whether this relationship exists for young males with high-functioning ASD, self-understanding was correlated with the socialization domain from the VABS.

The present study found a significant positive relationship between self-understanding and social functioning for participants with ASD. Specifically, social functioning was related to self-statements that demonstrated distinctness from others. Therefore the null hypothesis, that there is no significant relationship between self-understanding and social functioning, was rejected.

A more developed self-understanding may translate to better social functioning in young males with high-functioning ASD. If the direction of causality pertains self-understanding should be part of a social skills curriculum. For example, teaching individuals with ASD about the various aspects of self (physical, active, social, psychological features) and exploring ways to improve awareness of agency, continuity and distinctness.

8.5 Theory of mind

It has been hypothesised that impairments in ToM underlie the core social and communication symptoms in ASD (Baron-Cohen et al., 2000). The extent of the impairment has been demonstrated in a number of studies (Baron-Cohen & Goodhart, 1994; Baron-Cohen et al., 1986; Baron-Cohen et al., 1994; Brent et al., 2004; Leslie & Frith, 1988). Difficulties with ToM extend beyond social and communicative functioning and have been associated with educational success (Astington, 1988). The present study

compared false-belief understanding in individuals with high-functioning ASD and a TD group, and explored differences between the HFA and AD groups.

8.5.1 Theory of mind in ASD

A large number of research studies have demonstrated that children with ASD have difficulties attributing false-beliefs to others, children with ASD reporting what they know rather than what someone else could be thinking (Baron-Cohen et al., 1985; Baron-Cohen et al., 1986; Leekam & Perner, 1991; Perner et al., 1989; Reed & Peterson, 1990; Swettenham, 1996; Swettenham et al., 1996).

The results from the present study found the majority of participants passed the first-order false-belief ToM task, with the TD group approaching ceiling performance. The results supported the null hypothesis which states there is no significant difference between the ASD and TD groups.

A positive correlation was found between first-order ToM ability and verbal IQ for the ASD group. This was expected since previous research found that IQ was associated with false-belief performance in young people with ASD (Buitelaar & van der Wees, 1997; Dissanayake & Macintosh, 2003; Happe & Frith, 1996; Ziatas et al., 1998). A child with better verbal IQ is likely to perform better on false-belief ToM tasks.

Unlike past research that shows pass rates on ToM tasks are typically associated with language ability (Ziatas et al., 1998) the present study found no significant associations between receptive language ability and first-order ToM for either group. Therefore, first-order false-belief understanding may only be related to expressive language ability.

In the present study, a different pattern of results emerged for the second-order ToM task. Consistent with Ozonoff et al. (1991) there was a significant difference between the ASD and TD groups, with more TD participants passing the second-order belief question compared with the ASD group. The difference between the ASD and TD groups on the second-order task could be related to the additional complexity of the task. Compared with first-order tasks, second-order tasks have an increased information-processing load (i.e., they are longer, include more characters and episodes, and the narrative structure itself is more complicated). Other possible explanations for the lower performance of the ASD group in the second-order task may be related to participants having a specific deficit in motivation rather than an absence of knowledge in ToM (Boucher, 1989; Dunlap & Koegal, 1980; Koegal & Mentis, 1985; Koegel & Egel, 1979).

Previous research has found that IQ and language ability is associated with false-belief performance in young people with ASD (Buitelaar & van der

Wees, 1997; Ziatas et al., 1998). In the present study, there were positive correlations found between second-order ToM ability, full scale IQ and receptive language ability for the ASD group. These results suggest that ToM ability (as measured by false-belief understanding) is associated with IQ and receptive language ability for the ASD group only. These findings are consistent with previous research (Bauminger & Kasari, 1999; Milligan, Astington, & Dack, 2007; Tager-Flusberg & Sullivan, 1994; Ziatas et al., 1998) and provide further support for the argument that language and intellectual functioning play a vital role in second-order false-belief understanding and thus in the development of ToM.

The second-order justification question was difficult for both the ASD and TD groups, with fewer than half of the participants from each group passing the justification question. The findings from the present study are consistent with Bauminger and Kasari's research (1999) and found young males with ASD did not differ from TD comparisons on the justification question. The task required the children to verbally justify their responses to an unfamiliar person it is possible that some children were self-conscious and therefore spoke less and scored lower on the task. Nevertheless, it appears that children with ASD are equally able to justify their responses on second-order ToM tasks.

8.5.2 Theory of mind in HFA and AD

The HFA and AD groups were comparable in terms of performance on all ToM tasks. These findings are consistent with previous research (Baron-Cohen, 1989b; Baron-Cohen et al., 1985; Sigman et al., 1995) that found deficiencies in first and second-order ToM abilities are common to both individuals with HFA and AD. In addition, there was no significant difference between the HFA and AD groups on the second-order ToM justification question. These findings align with previous research (Baron-Cohen, 1989b; Baron-Cohen et al., 1985; Sigman et al., 1995) that suggests that HFA and AD cannot be distinguished on ToM ability. Future research and intervention targeting ToM should combine the two disorders.

8.6 Self-understanding and theory of mind

A theoretically important question for philosophers and psychologists is whether the same cognitive mechanism required for self-understanding is also necessary for ToM. If self-understanding is related to ToM for young males with ASD, social skills interventions aimed at improving self-understanding may simultaneously improve ToM, or vice versa.

8.6.1 Self-understanding and theory of mind in ASD

A number of significant positive correlations were found between self-understanding and second-order ToM ability for the ASD group only. These

findings are consistent with Yoshi and Yoshimatsu (2003) who found a robust positive relationship between self-understanding and ToM for young people with ASD. However, it should be noted the Yoshii and Yoshimatsu study (2003) assessed adolescents (14-18 years) who had autism and an intellectual disability whereas the present study focused on high-functioning children and adolescents with ASD.

The results from the present study suggested for young males with high-functioning ASD, self-understanding was strongly linked to ToM. This suggests that if children with ASD have difficulty with one capacity (e.g. ToM) then they are likely to have difficulty with the other (self-understanding) or vice versa. Self-understanding and ToM are required for effective social functioning and should be incorporated into intervention programs for individuals with ASD, however the results suggest that interventions aimed at improving self-understanding may also improve ToM. The findings support Hobson's theory and theory-theory. For young males with high-functioning ASD, self-understanding and ToM are connected and may stem from a common underlying cognitive framework.

Hobson (1982) proposed that self-understanding is critical to and underlies the ability to understand others' mental states. Although direction of causality cannot be inferred from a correlational study, if Hobson is correct and the

direction of causality pertains then the relationship between self-understanding and ToM for participants with high-functioning ASD is better explained by simulation theory (Gordon, 1996; Harris, 1992). Simulation theorists (Gordon, 1996; Harris, 1992) argue that children's abilities at using their own mental states (self-understanding) are employed to simulate those of others (ToM).

An unexpected finding was that there were no significant correlations between self-understanding and ToM for the TD group. This finding is inconsistent with previous research (Banerjee & Yuill, 1999; Bosacki, 2000; Gopnik & Meltzoff, 1994; Hatcher et al., 1990; Homer & Astington, 1995; Lang & Perner, 2002; Wimmer & Hartl, 1991). However, there were a number of differences between the present study and past research such as the age, ethnicity and gender of participants. Future research could investigate these variables to determine if they mediate the relationship between self-understanding and ToM.

8.6.2 Self-understanding and theory of mind in HFA and AD

There has been no prior research located on the link between self-understanding and the understanding of others' mental states for the distinct conditions of HFA or AD. Interestingly, the positive relationship between self-understanding and ToM found in the ASD group, only held for the HFA group,

while in the AD group no significant relationship between the variables was found. There are a number of possible explanations for the relationship between self-understanding and ToM for the HFA group. Variables not measured in the study may have influenced the results, for instance, expressive language skills (Ziatas et al., 1998) and co-morbid psychiatric conditions such as anxiety and depression (Tonge et al., 1999). Compared to the AD and TD groups young people with HFA may have had less developed expressive language skills and more symptoms of anxiety and depression which may help to explain the differences between the HFA group and the other groups.

The lack of association for self-understanding and ToM for the AD group may be explained by the presence of a separate cognitive mechanism responsible for first person mentalising (self-understanding) and another separate mechanism for ToM (Nichols & Stich, 2002).

This finding has significant implications for the treatment of individuals with AD, as separate interventions may be required to improve self-understanding and understanding of others. However, for individuals with HFA, treatments aimed at improving self-understanding may simultaneously improve ToM, or vice versa. It would be useful if future research confirmed the direction of causality through the use of a longitudinal study to determine if the focus of

intervention should be on expanding self-understanding or teaching ToM ability.

8.7 Subsidiary analyses

8.7.1 Theory of mind and social functioning

The relationship between ToM and real life social skills in children with ASD is not clear. Some studies have shown a significant correlation between ToM skills and social functioning (Frith et al., 1994; Tager-Flusberg, 2003a), while other studies have failed to find an association (Bowler, 1992; Dawson & Fernald, 1987; Fombonne et al., 1994; Klin, 2000; Peterson et al., 2007; Prior et al., 1990; Roeyers et al., 2001; Sparrevohn & Howie, 1995).

The present study found no significant relationships between social functioning and ToM for the ASD, TD, HFA and AD groups. These findings are consistent with Dissanayake and Mackintosh (2003), Dawson and Fernald (1987), Fombonne, Siddons, Achard, Frith and Happe (1994), Klin (2000); Peterson, Slaughter and Paynter (2007), Prior, Dahlstrom and Squires (1990), Roeyers, Buysse, Ponnet and Pichal (2001), Sparrevohn and Howie (1995) who found no relationship between ToM ability and social functioning.

A number of explanations have been provided for the lack of significant associations between ToM and social functioning. The “hacking” hypothesis postulates that children with high-functioning ASD who pass ToM tasks arrive at the correct answer via non-mentalistic compensatory strategies (Dissanayake & Macintosh, 2003). Furthermore, ToM ability (especially as assessed by false-belief tasks) may influence only a relatively narrow range of social behaviours and not social competence in the broader sense (Astington, 2003; Frith et al., 1994), and motivation may be required before children apply false-belief understanding to real-life interactions (Astington, 2003).

8.7.2 Self-understanding and participation in formal social skills training programs

Children with ASD are often referred for social skills training (Barry et al., 2003; Blacher et al., 2003; Mesibov, 1994; Tse et al., 2007) because improvements in social functioning have been identified as one of the most critical areas needing remediation and affecting intervention outcomes (Kransy & Ozonoff, 2003; Rogers, 2000). However, empirical support for social skills training programs for children with high-functioning ASD appears to be limited (Rao, Beidel, & Murray, 2008).

While it was outside the scope of this study to investigate the effectiveness of social skills training programs for each of the participants, parents were questioned about whether their child had previously participated in any formal social skills training. It was expected that children with ASD who had participated in social skills training would show a different pattern of results from children who had not undergone formal training. In the present study, children who had previously participated in formal social skills training programs were not found to have achieved higher scores on the self-understanding interview than those who had not participated in programs. Similarly, participation in social skills training was not associated with higher scores on the measure of social functioning. These findings complement the work of Bellini, Benner, Peters and Hopf (2007) who demonstrated the limited effectiveness of social skills interventions available for children with ASD.

It is possible that participation in formal social skills training alone does not translate to improved social functioning for children with high-functioning ASD. Given that children with ASD find it difficult to generalise skills that they have learned (Barry et al., 2003; Rogers, 2000), it is possible that regular program attendance is necessary to improve their social skills and gives them the confidence to engage in social interactions. Nonetheless, it has been found that children who have participated in social skills training programs appeared to find it a positive experience, which provided a context for

meaningful peer relationships with other children and a strong feeling of acceptance by their peers. Thus, regular attendance in social skills programs may provide the social support that many high-functioning individuals require (Barry et al., 2003).

8.7.3 Theory of mind and participation in social skills training programs

There is some evidence that ToM skills can be learned during social skills training by individuals with ASD. However it seems that these skills do not translate to social competence (Chin & Benard-Opitz, 2000; Frith & Happe, 1999; Hadwin, Baron-Cohen, Howlin, & Hill, 1996, 1997; Klin, 2000; Ozonoff & Miller, 1995). The present study found no significant differences between participants with ASD who had participated in social skills training and those who had not participated in social skills training on the first and second-order ToM tasks, with the exception that the second-order justification question approached significance. The social skills programs that participants attended may not have had enough emphasis on ToM skills. Previous research has shown that children with more advanced ToM have more successful social relationships than their less advanced peers (Watson, Nixon, Wilson, & Capage, 1999). Focusing more directly and specifically on these skills (e.g. recognising and understanding emotions, desires and beliefs of others) might

increase the benefits that participants obtain from attending these social skills programs.

The results from the present correlational study are consistent with previous intervention studies, finding no link between participation in social skills training and ToM ability. However, the present study did not include data on the number, types or duration of social skills programs, which may be important in determining the relationship. More research needs to be conducted on social skills training to determine the most effective strategies, programs and curricula for improving the social skills outcomes for young people with high-functioning ASD.

8.8 Limitations and strengths

This study has provided some important information on self-understanding and ToM in high-functioning males with ASD. However, it is not without limitations.

Since this study was correlational research the results do not indicate causation. In addition, owing to difficulties with recruitment, the age range of participants was broad, which may have provided for more variance in the developmental levels of the participants. The present study only recruited

male participants; therefore, generalisations cannot be made to females or other age groups.

Studying self-understanding using a semi-structured interview has limitations. For example, the self-understanding interview relied on language ability and the ability to think in words. Schopler et al (1980); Park and Youderian (1974) and Grandin (1992) have claimed that visual thinking is the preferred mode of problem solving for high-functioning individuals with ASD. Therefore, for people with ASD, self-understanding may not be captured completely by descriptions in words. Visual images may help individuals with ASD to think about psychological aspects of self (including their thoughts). If the ASD participants had been given the opportunity to write down, draw or select pictures, they may have been able to describe themselves in more detail.

A further limitation of the study was the reliance on false-belief tasks to measure ToM ability. False-belief tasks are associated with language ability and cognitive functioning and may not capture all aspects of the broader construct of ToM (Lewis, Freeman, Hagestadt, & Douglas, 1994; Lewis & Osborne, 1990). Furthermore, the first-order ToM task may have been too easy for the groups. First-order ToM was measured using the Sally-Anne task, the majority of participants in both groups passed and there was no difference between the two main groups.

In the present study language comprehension was measured using the Peabody Picture Vocabulary Test–Third Edition (PPVT-III) (Dunn & Dunn, 1997) and there was no difference between the two main groups. However, the PPVT-III only measures receptive language and vocabulary size, and it lacks sufficient sensitivity for unravelling the depth of lexical knowledge and expressive language ability.

Although the number of participants at the ASD/TD level was considered a strength, within the ASD groups of AD and HFA the sample was relatively small. Furthermore, this was a correlational study designed to investigate new hypotheses therefore appropriate cautions are needed for replication with larger sample sizes.

Despite its limitations, the present study has several strengths. A pivotal strength of the study is that it included qualitative analysis which incorporated the voices of individuals with ASD, their self-descriptions, perspectives and concerns. According to Smukler (2005) there is no better source of evidence about a person's knowledge of self than what they say, because this gives a view into someone's state of mind and depth of self knowledge.

The sample size in the present study was large enough to detect statistical significance and allowed the researcher to confidently reject or accept the null

hypotheses. Furthermore, a number of participants from the ASD group were from regional areas, making the sample more demographically representative.

In the present study, participants were not accepted into the study without accompanying documentation supporting their diagnosis. In addition, all participants with an ASD were assessed by a psychologist (experienced in the assessment and diagnosis of ASD) to confirm diagnosis. This ensured that all the participants with ASD were accurately diagnosed.

Furthermore, in the key measures of receptive language ability and IQ, the ASD and TD groups were reasonably similar. This ensured that the results were based on the characteristics of the groups rather than group differences in receptive language and IQ.

8.9 Suggestions for future research

Results from this study, and others, indicate the need for further research into the social functioning of individuals with high-functioning ASD. The present study indicates a number of areas that still need to be investigated in the self-understanding, social functioning and ToM abilities of children and adolescents with high-functioning ASD.

While the present study has found a relationship between self-understanding and ToM in young males with high-functioning ASD and the results support theory-theory as a useful theoretical framework, future research should attempt to replicate these results to confirm whether self-understanding and ToM are perhaps components of the same underlying mechanism, and possibly provide a reason why the relationship did not appear to exist for the AD group. There may be a separate cognitive mechanism responsible for first person mentalising (self-understanding) and another separate mechanism for ToM for individuals with AD and cases in which one of these capacities (e.g. ToM) is impaired while the other is intact (e.g. self-understanding) (Nichols & Stich, 2002).

Further experimentation with different techniques, across a whole battery of tasks could be employed for probing self-understanding and ToM in ASD. In addition, a useful aim would be to reduce the number of confounding variables so that attention can be more directly focused on the underlying mechanism. For example, instead of using a measure of receptive language, a more broad measure could be used which includes both expressive and receptive language ability.

It may prove beneficial for future research to move beyond a cross-sectional approach and examine self-understanding and ToM in the same individuals

over time, comparing the results with the developmental progression seen in those considered TD. Furthermore, it would be useful to compare self-understanding and ToM across different age groups such as preschoolers, school aged children, adolescents and adults and to compare the results with the developmental progression seen in TD. It may also be of interest to investigate self-understanding and ToM in females with ASD for any evidence of gender differences. In addition, it may be of interest to investigate the role of siblings on self-understanding, ToM and social functioning.

The relationship between ToM abilities, self-understanding and social behaviours needs to be explored in more depth in order to help identify specific abilities that facilitate improved social behaviour; these can then be targeted during social skills intervention.

The present study did not find a significant relationship between ToM and social functioning in young people with ASD. In addition, those who had participated in formal social skills training did not perform better on standard ToM tasks than those who had not participated in social skills training. In contrast, there was a significant relationship between self-understanding and social functioning for the ASD group, and there was a trend towards a more sophisticated self-understanding for those who had participated in social skills

training. It is possible that social skills improve as one develops a more sophisticated understanding of the self.

There is a need for more studies of social skills intervention, including programs that aim to improve self-understanding. Intervention studies should trial different models of intervention. For example, individualised direct instruction versus small and large group sessions, and different strategies (for example, comic strip conversations, social stories, video taped self-monitoring, role play or behavioural rehearsal).

8.10 Implications

The present study provides several significant implications for the treatment of young people with high-functioning ASD. For example, the results provide a baseline of self-understanding for this population which is useful for clinical practice and future research.

It appears that there are specific rather than “global” aspects of self-understanding that are selectively absent or impaired in young males with high-functioning ASD, in that they were less likely than TD individuals (of approximately the same age, receptive language and general intellectual ability) to view themselves in the context of their own social and psychological attributes

In addition, the ASD group were less aware of the control they have on their own actions. Intervention programs for children with ASD should aim to increase their awareness of agency and teach ways to self-regulate emotions as this may translate to less problematic behaviour and reduce caregiver stress.

The ASD group was less likely to report personal accomplishments than the TD group, and of those participants with ASD who mentioned their disorder, most had negative schemas and thoughts about their condition. Intervention could aim to improve self-understanding and awareness of own mental states in young people with ASD. Clinicians can help the child diagnosed with one of the ASD to have better access to his or her mental states and to identify them as mental states (beliefs, desires) by making them concrete (pictures, words). Keeping a diary about events or practising self-talk may also help improve self-understanding.

In addition, it would be useful for therapeutic interventions to focus on improving self-efficacy and self-competence as well as improving the young people's negative views about their condition. The focus of intervention should be on positive 'differences' rather than deficits or problems. Changing the negative social constructions of ASD may help improve the quality of life for people with ASD.

Although some researchers have found differences between HFA and AD, methodological issues are widespread. Many studies including the present study have found few qualitative differences between the two groups. These results support the hypothesis that AD is on a continuum with autistic disorder. The present study supports the spectrum concept of autistic-type disorders, rather than being clearly distinct categories, with the spectrum based on severity of autistic symptoms (Prior et al., 1998). Future research should consider investigating whether the two disorders can be combined; diagnostic classification systems may need to be revised.

8.11 Conclusion

It is clear that children with high-functioning ASD can talk about themselves, but when they do, they reveal how similar and different they are to children who do not have ASD. They are similar in so far as they can describe their bodies, possessions and their activities. They are different in so far as they do not talk about feelings, cognitive capabilities, and social relations and rarely compare and contrast themselves with others. In addition, they lack insight into the control and self-monitoring of their actions. Of those young people with ASD who mentioned their disorder, most did so in a negative way.

These findings suggest that young high-functioning males with ASD have difficulties integrating various aspects of themselves and are less aware of their own mental states. Furthermore, the findings indicate a general delay in the development of self-understanding since relatively high proportions of physical self-statements and relatively few social and psychological statements have been reported for young TD children. The results help to explain why individuals with ASD have difficulties relating to others and support the practice of teaching self-understanding and interventions aimed at improving the self-worth of children with high-functioning ASD. Young people with high-functioning ASD should have their diagnosis explained to them as a “difference” rather than a disorder of deficits.

The validity of AD as a distinct diagnostic entity from HFA has generated considerable debate and remains controversial. The results from the present study suggest that HFA and AD were comparable in terms of self-understanding and ToM ability. However, there were some important differences in terms of the relationship between self-understanding, ToM and social functioning.

A positive relationship was found between self-understanding and ToM for the HFA group suggesting that for young males with HFA, theory-theory is a constructive theoretical framework for explaining the relationship between

self-understanding and ToM. It also suggests that the two abilities stem from a common underlying cognitive framework. Consequently, treatments aimed at improving self-understanding may simultaneously improve ToM, or vice versa.

There was a lack of association for self-understanding and ToM for the AD group and this may be explained by the presence of a separate cognitive mechanism responsible for self-understanding and another for ToM. Therefore, different interventions may be required; one to improve self-understanding and another to improve the understanding of others' minds.

The present study found a significant positive relationship between agency self-statements (awareness of one's own actions and behaviour) and social functioning for the HFA group only. A more in depth awareness and better understanding of the control one has on his own actions and behaviour may translate to improved interpersonal skills and a reduction in behaviour problems in young males with HFA. If the direction of causality pertains, self-understanding (particularly agency) should be an essential part of social skills curriculum for young people with HFA. The lack of association between self-understanding and social functioning for the AD group suggests that self-understanding is not valid in terms of actual social behaviour for young people with AD.

In conclusion, children with high-functioning ASD are less aware of their own and others' mental states. This study provided important information on the social deficits of young males with high-functioning ASD and presented evidence on self-understanding, ToM and social functioning which may assist clinicians developing individual social skills training programs and developing evidenced based practice parameters. Future researchers and clinicians will benefit from this study as it has provided a baseline of self-understanding for young males with high-functioning ASD. Intervention studies should further investigate how self-understanding and ToM can improve the social skills outcomes for young people with high-functioning ASD.

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APPENDICES

APPENDIX A

Appendix A1: Participant information statement for participants

You are invited to take part in a project on self-understanding in children with High-Functioning Autism and Asperger's Disorder. It will help us understand young people with High-Functioning Autism and Asperger's Disorder and assist in the development of interventions and theories on social functioning. The information will also provide helpful information for services. The researcher is Fiona Martin PhD candidate, with the help and supervision of Associate Professor Susan Hayes from the Centre for Behavioural Sciences in Medicine at The University of Sydney. If you agree to be involved in this project, we will ask you and your parent/carer or guardian some questions about what you are good at and what you are not so good at, to know more about you. The whole process will take between two and three hours and we can spread the interview over two sessions to suit you. The interview might be tiring, but you can decide to stop whenever you like.

The answers to your questions will be kept private (confidential) and only Fiona Martin (the researcher) will have access to information on you, except as required by law. Also, a report of the study may be published, but your name will be removed so that you cannot be identifiable in such a report. Although, it is hoped that this project will help people with Autism and Asperger's Disorder by providing information about them to service providers, it may not be of direct benefit to you. However we will provide you with an up-to-date assessment.

Participation in this study is entirely up to you- it is voluntary: you do not have to be involved, if you do get involved (participate) you can pull out or withdraw at any time. When you have read this information, Fiona Martin will talk to you and answer any questions you have. If you would like to know more about this project, please contact Fiona Martin on (02) 9351 2776. This information sheet is for you to keep.

Anyone with concerns or complaints regarding the conduct of a research study can contact the Manager for Ethics Administration, The University of Sydney on (02) 9351-4811.

Appendix A2: Participant information statement for parents/carer/guardians

You are invited to take part in a project on self-understanding in children with High-Functioning Autism and Asperger's Disorder. It will help us understand young people with High-Functioning Autism and Asperger's Disorder and assist in the development of interventions and theories on social functioning. The information will also provide helpful information for services. The researcher is Fiona Martin PhD candidate, with the help and supervision of Associate Professor Susan Hayes from the Centre for Behavioural Sciences in Medicine at the University of Sydney.

We are asking that you agree for your child/ or person you are responsible for to participate in this study. If you agree, and the person also agrees, we will do some psychological assessments and be asking some questions to you and the participant. The questions will be about: the sort of things the participant is good at and not so good at, the participant's daily life and we will also gather information about the participant's thoughts and behaviours. The whole process will take between two and three hours and we can spread the interview over 2 sessions to suit you. The interview might be tiring, but you can decide to stop whenever you like.

All aspects of the study, including results, will be strictly confidential and only the investigator named above will have access to information on participants, except as required by law. Also, a report of the study may be submitted for publication, but individual participants will not be identifiable in such a report. While we intend that this research study furthers medical and psychological knowledge and may improve interventions for young people with High-Functioning Autism and Asperger's Disorder in the future, it may not be of direct benefit to you, but will provide the participant with an up-to-date assessment. Participation in this study is entirely voluntary: you are in no way obliged to participate and – if you do participate – you can withdraw at any time. Whatever your decision, please be assured that it will not affect your relationship with The Autism Association of NSW. When you have read this information, Fiona Martin will discuss it with you further and answer any questions you have. If you would like to know more at any stage, please feel free to contact Fiona Martin on (02) 9351 2776. This information sheet is for you to keep.

Anyone with concerns or complaints regarding the conduct of a research study can contact the Manager for Ethics Administration, The University of Sydney on (02) 9351 4811.

Appendix B

Appendix B1: Consent form for the participant

I, _____, understand this is a project about self-understanding in children with High-Functioning Autism and Asperger's Disorder, as explained in the Information Statement. I consent (give permission) to participate in the project. My consent is voluntary and I understand that all the information will be handled in the strictest confidence and that my participation will be kept private and my name will be removed from any reports. I understand I will be asked to answer some questions about myself in the past and at present. I also understand that I will be asked about things that I am good at and things that I am not so good at. I understand that my parent/carer or guardian will also be asked to answer some questions about me. This may take 2 to 3 hours. I understand these answers will be seen only by the researchers (Associate Professor Susan Hayes and Fiona Martin, PhD Candidate) in the Centre for Behavioural Sciences in the Department of Medicine at the University of Sydney and will be used only in this project, except as required by law. Information, which would identify me, will be removed from the results at the University. No information about me will be given to any government department, or anyone else. I understand that even after I have agreed to be in the study, I can decide at any time that I do not want to be in the study after all, and I can withdraw or pull out without any punishment or penalty. If I pull out, any information about me will be destroyed.

I agree to participate in the project.

Participants Name (block letters)

Signed _____

Witness' signature _____

Date _____

Name _____

Date _____

Anyone with concerns or complaints regarding the conduct of a research study can contact the Manager for Ethics Administration, The University of Sydney on (02) 9351-4811.

Appendix B2: Consent form for Parent/Carer/Guardian or Person Responsible

I, _____, understand the purpose of the study is about self-understanding in children with High-Functioning Autism and Asperger's Disorder, as explained in the Information Statement. On behalf of the person for whom I am parent/carer/guardian consent to participation in the study. My consent is voluntary and I understand that all the information will be handled in the strictest confidence and that my participation and the participant for whom I am responsible will be not be individually identifiable in any reports. I understand that both the person for whom I am responsible and I will be asked to answer some questions about the participant and do some psychological assessments, as explained in the information statement. This may take 2 to 3 hours. I understand these results will be seen only by the researchers (Associate Professor Susan Hayes and Fiona Martin, PhD Candidate) in the Centre for Behavioural Sciences in the Department of Medicine at the University of Sydney and will be used only in this project, except as required by law. Information, which would identify the participant or me, will be removed from the results at the University. No information about the participant or me will be given to any government department, or anyone else. I understand that even after the participant and I have agreed to be in the study, the participant and me can decide at any time that we do not want to be in the study after all, and can withdraw without any penalty. If we withdraw, any information about the participant will be destroyed. On behalf of the person for whom I am responsible agree to participate in the study.

I, _____ am the guardian/person responsible for _____

I have read the Information and the Consent Form for this study and I consent on behalf of this person.

Signed _____ Witness' signature _____

Date _____ Name _____

Date _____

Anyone with concerns or complaints regarding the conduct of a research study can contact the Manager for Ethics Administration, The University of Sydney on (02) 9351-4811.

Appendix C

General Questionnaire

Completed as part of an interview with Parent/Carer/or Person responsible

PERSONAL INFORMATION

Name:

Date of Birth: (dd/mm/yy) _____

ID:

1. Residence

Urban / Rural

2. Indigenous Australian

Yes / No

3. Education level

a. Primary

b. Secondary

c. TAFE

d. Finished School

Education Setting

- a. Mainstream school in regular class without teacher's aide
- b. Mainstream school in regular class with P/T teacher's aide
- c. Mainstream school in regular class with F/T teacher's aide
- d. Mainstream school in support class eg: ASD, IM
- e. Special school
- f. Not in educational setting

4. Siblings

Lives with siblings Yes / No

5. Parents

Lives with biological parents Yes / No

Lives with both parents Yes / No

6. Socio-economic status

(Based on occupation and education of parents)

Education level:

Occupation:

- a. Upper or upper-middle class
- b. Middle class
- c. Lower-middle class
- d. Lower class

7. Social skills training

Participation in formal social skills training Yes / No

How many?

8. Medications

Use of Medication Yes / No

Type of medication:

- a. Stimulants
- b. Anti-depressant medication
- c. Anti-psychotics
- d. Anti-convulsants
- e. Anxiolytic medication

9. Behaviour

- | | |
|---|--|
| Splinter skills | Yes <input type="checkbox"/> / No <input type="checkbox"/> |
| Savant skills | Yes <input type="checkbox"/> / No <input type="checkbox"/> |
| Hyperactivity | Yes <input type="checkbox"/> / No <input type="checkbox"/> |
| Short Attention Span | Yes <input type="checkbox"/> / No <input type="checkbox"/> |
| Aggressiveness to others | Yes <input type="checkbox"/> / No <input type="checkbox"/> |
| Self-Injurious Behaviours | Yes <input type="checkbox"/> / No <input type="checkbox"/> |
| Abnormalities in mood or affect | Yes <input type="checkbox"/> / No <input type="checkbox"/> |
| Lack of fear in response to real dangers | Yes <input type="checkbox"/> / No <input type="checkbox"/> |
| Excessive fearfulness to harmless objects | Yes <input type="checkbox"/> / No <input type="checkbox"/> |
| Odd responses to sensory stimuli | Yes <input type="checkbox"/> / No <input type="checkbox"/> |
| Seizures | Yes <input type="checkbox"/> / No <input type="checkbox"/> |
| Motor Clumsiness and awkwardness | Yes <input type="checkbox"/> / No <input type="checkbox"/> |
| Symptoms of Depression | Yes <input type="checkbox"/> / No <input type="checkbox"/> |